California High-Speed Rail Authority

RFP No.: HSR 13-57

Request for Proposal for Design-Build Services for Construction Package 2-3

Reference Material, Part E.3 – Fresno-Bakersfield Section 401 Permit Application

CALIFORNIA
High-Speed Rail Authority
Northern California Regional Office

March 21, 2014

Clifford Harvey
Division of Water Quality – 401 Certification and Wetlands Unit
State Water Resources Control Board
1001 I Street
15th Floor
Sacramento, CA 95814

RE: California High-Speed Train Project, Fresno to Bakersfield Section, Permitting Package 1, Application for Water Quality Certification

Dear Mr. Harvey:

Please find enclosed an application for certification that regulated permanent and temporary fills associated with permit package 1 (PP1) for the Fresno to Bakersfield Section of the California High-Speed Train Project meet applicable state and federal water quality standards. These materials are also available at the following link:

https://WW3.projectsolve2.com/eRoom/SFOF2/EnvironmentalResourceAgencies/0_3ee2c

The following items have been provided at this location:

1. An electronic copy of the application,
2. Attachment 1: Project Description,
3. Attachment 2: Design Drawings and Typical Cross Sections,
4. Attachment 3: Post-Construction Stormwater Quality Standards and Water Quality Technical Report,
5. Attachment 4: Impact Waterbodies in the PP1 Study Area, and;
6. Attachment 5: Project Impact Mapbook.

In addition, a copy of the associated application for a permit to discharge to waters of the United States under Section 404 of the Clean Water Act has been saved at the same file path. The selection of alternatives and Clean Water Act Section 404(b)(1) analysis for the project are governed by the Memorandum of Understanding (MOU) among the Federal Railroad Administration (FRA), California High Speed Rail Authority (Authority), Environmental Protection Agency (EPA), and U.S. Army Corps of Engineers (USACE).

Letters of agreement and concurrence from the EPA and USACE for the checkpoints under the MOU are also available at this location on ProjectSolve.

Please note that due to minor design changes the impact numbers (> 3 acres) in the enclosed 401 application have been revised and updated relative to the numbers in the 404 permit application; we are submitting an update to the USACE so that impacts to waters of the United States match across both applications.

The Authority is working with the FRA to complete the joint Final Environmental Impact Report/Environmental Impact Statement (FEIR/FEIS) for the section. The Authority expects to execute a notice of determination for the FEIR on April 30, 2014.

Should you have questions, require clarification, or need any additional information, please do not hesitate to contact me at (916) 403-6934 or Mike Aviña, of the Project Management Team, at (916) 761-2768.

Sincerely,

Mark A. McLoughlin
Director of Environmental Services
California High-Speed Rail Authority

Electronic copies furnished:

Stephanie Perez, FRA
David Valenstein, FRA
Zachary Simmons, USACE
Kate Dadey, USACE
Jennifer Blonn, EPA
Sarvy Mahdavi, EPA
Annalisa G. Kihara, SWRCB
Diana Gomez, CAHSRA
Gary Kennerley, PMT

CALIFORNIA HIGH-SPEED TRAIN

Environmental Permitting

Section 401 Water Quality Certification Application

Fresno to Bakersfield

March 2014

RFP No.: 13-57 – Addendum No. 5 - 10/09/2014

CALIFORNIA High-Speed Rail Authority

U.S. Department of Transportation
Federal Railroad Administration

Fresno to Bakersfield Section

Section 401 Water Quality Certification Application

Permitting Phase 1 of the Fresno to Bakersfield Section

Prepared by:

URS/HMM/Arup Joint Venture

March 2014

STATE WATER RESOURCES CONTROL BOARD

CLEAN WATER ACT §401
WATER QUALITY CERTIFICATION
APPLICATION FORM

State Water Resources Control Board

Division of Water Quality

1001 I Street • Sacramento, California 95814 • (916) 341-5455
Mailing Address: P.O. Box 100 • Sacramento, California • 95812-0100
FAX (916) 341-5463 • http://www.waterboards.ca.gov

Linda S. Adams
Acting Secretary for Environmental Protection

Edmund G. Brown Jr.
Governor

CLEAN WATER ACT §401 WATER QUALITY CERTIFICATION APPLICATION FORM

(Use only for multi-regional projects, otherwise use the appropriate Regional Board application form)

1. APPLICANT/AGENT INFORMATION

a) Applicant: California High Speed Rail Authority c/o Mark A. McLoughlin	b) Agent[1]: Kevin Melanephy
Address: 770 L Street, Suite 800	Address: 1333 Broadway , Suite 800
Sacramento, CA 95814	Oakland, CA 94612-1924
Phone No. (916) 403- 6934	Phone No. (510) 874-3256
Fax No. (916) 322-0827	Fax No. (510) 874-3268
E-mail Address: Mark.Mcloughlin@hsr.ca.gov	E-mail Address: kevin.melanephy@urs.com

Have you previously contacted the Regional Board staff regarding this project? If 'yes' provide information on date, person, and brief summary of subject matter.

Cliff Harvey has been identified by the SWRCB as the primary contact for the project.

- September 4, 2012 – Initial meeting at California Environmental Protection Agency in Sacramento with SWRCB regarding permitting issues, requirements, and content.
- August 12, 2013 – Permitting kick off meeting at California Environmental Protection Agency in Sacramento with SWRCB that discussed the project history, alignment, wetland delineation, and proposed schedule for submittal of project deliverable.

STATEMENT OF AUTHORIZATION

I hereby authorize ________________________ to act in my behalf as my agent in the processing of this application, and to furnish upon request, supplemental information in support of this permit application.

_______________________________ Applicant's Signature

_______________________________ Date

[1]Complete only if applicable

2. PROJECT DESCRIPTION

a) Project Title: California High-Speed Train (HST Project), Fresno to Bakersfield Section, Permitting Phase 1 (PP1)
b) Project Purpose: See Section 2, Block 2b of the Section 401 Water Quality Certification Application Supplemental Information
c) Project Activities: See Section 2, Block 2c of the Section 401 Water Quality Certification Application Supplemental Information
d) Proposed Schedule (start-up, duration, and completion dates): See Section 2, Block 2d of the Section 401 Water Quality Certification Application Supplemental Information

3. FEDERAL LICENSES/PERMITS

a) Federal Agency(ies)/File Number(s): U.S. Army Corps of Engineers_X_ Other__X_(FRA and USFWS) File No.(s) (if known)__SPK-2009-01482 See Other Requisite Material on CD-ROM for copies of USFWS biological opinion (BO) and No Effect Determination Letter to NMFS
b) Permit Type(s) (please provide permit number(s) if known): USACE Section 404 Permit, SPK-2009-01482, to be submitted January 24, 2014 Nationwide Permit No.(s) N/A Regional General Permit No.(s) N/A Individual Permit_Yes_ Other_N/A USACE Section 408, TBD. Design Build contractor (D/B) will get encroachment permits from Central Valley Flood Protection Board.
c) Does the project require any Federal Application(s), Notification(s) or Correspondence? Yes __X__ (attach copy[ies]) No _____ (attach detailed explanation) The Federal Railroad Administration's (FRA) action is the partial funding of the HST Project with American Recovery and Reinvestment Act money. This action requires NEPA review. The FRA determined the implementation of the project would have a significant impact on the environment and subsequently prepared an EIR/EIS. A Record of Decision is expected (Spring, 2014; provided with Other Requisite Material on CD-ROM). A federal permit is to be obtained from the USACE. USFWS issued a BO on February 2013, and amended BO is expected in Spring, 2014 pertaining to the species under its jurisdiction which are anticipated to potentially be impacted by the HST Project. A No Effect Determination Letter was submitted to NMFS on June 2011. See Other Requisite Material on CD-ROM for copies of USFWS BOs.
d) Provide copies of the license/permit/application. USACE Section 404 Individual Permit Application, Permitting Phase 1 is provided with Other Requisite Material on CD-ROM; the USACE Section 408 Permit Application is currently in preparation and will be provided to the SWRCB upon completion.

4. OTHER LICENSES/PERMITS/AGREEMENTS

a) Please list all other required, including local regulatory approvals (submit final or draft copy if available). Include information on any De-watering, NPDES, and Storm Water permits.

Agency	License/Permit/Agreement	Permit No.	Approval Date
CDFW	Section 1602 – Master Streambed Alteration Agreement (sub-notification prepared by D/B) Section 2081 – Incidental Take Permit	TBD	Anticipated issuance August 2014
CVFPB	Encroachment Permit - Section 208.10 (prepared by D/B)	TBD	Anticipated issuance of multiple encroachment permits: 2014 through 2017
SWRCB	National Pollutant Discharge Elimination System – Construction General Permit	TBD	Anticipated notification: 2014
SWRCB	Statewide General Waste Discharge Requirements for Discharges to Land with a Low Threat to Water Quality	TBD	TBD
RWQCB-R5	Waste Discharge Requirements for Dewatering and Other Low Threat Discharges to Surface Waters	TBD	TBD
Caltrans	Encroachment Permit	TBD	TBD

b) Does the project require a Federal Energy Regulatory Commission (FERC) license or amendment to a FERC license?

No _X_ Yes_______ (attach application copy)

5. CALIFORNIA ENVIRONMENTAL QUALITY ACT (CEQA)

Indicate CEQA Document (submit final or draft copy if available*):

Type of CEQA Document	Date of filing of Notice of Exemption/ Preparation and Name of Lead Agency
Statutory Exemption/Class Title	
Categorical Exemption/Class Title	
Negative Declaration	
Mitigated Negative Declaration	
Environmental Impact Report	California High Speed Rail Authority, Notice of Determination expected to be filed Spring, 2014

Electronic copy of the Fresno to Bakersfield Section Final EIR/EIS and Notice of Determination will be included with Other Requisite Material on the CD-ROM accompanying this application.

Note: Ample time must be provided to the certifying agency to properly review a final copy of valid CEQA documentation before certification can occur.

RFP No.: 13-57 – Addendum No. 5 - 10/09/2014

6. APPLICATION FEE

Provide an initial deposit of $1,097 for the application. Please write a check made out to the State Water Resources Control Board.
Is a check enclosed? Yes __X__ No. _____ Check Number __TBD__ Amount $1,097

7. PROJECT SITE DESCRIPTION – GENERAL (Include areas outside of US waters)

a) Project Location (attach map of suitable quality and detail):

City or Area ________FRESNO________ County __Fresno, Kings, Tulare, Kern

Longitude/Latitude 119°47'3.50"W / 36°43'25.66"N to 119°19'88.06"W / 35°44'16.35"N

See Section 5 of the Section 401 Water Quality Certification Application Supplemental Information.

b) Total Project Size: ______5,900________acres ____528,000_____ linear feet (if appropriate)

c) Site description of the entire project area (including areas outside of jurisdictional water of the US):
See Section 5, Project Site Description – General, of the Section 401 Water Quality Certification Application Supplemental Information.

8. WATER BODY IMPACT

a) **Water Body Name(s)**[2]: See Section 6, Waterbody Impact, of the Section 401 Water Quality Certification Application Supplemental Information.
Clearly indicate on a published map of suitable detail, quality, and scale (1:24K) to allow the certifying agency to easily identify the area(s) and water body(ies) receiving any discharge.

b) **Fill and Excavation:** Indicate in ACRES and/or LINEAR FEET the proposed waters to be impacted, and identify the impacts(s) as permanent and/or temporary for each water body type listed below:

Water Body Type	Permanent Impact		Temporary Impact	
	Acres	Linear Feet	Acres	Linear Feet
Wetland[3]				
Streambed				
Lake/Reservoir				
Ocean/Estuary/Bay				
Riparian				
Non-Federal Waters				

Provide the name, title, and affiliation of person that carried out wetland delineation.
See Section 6, Block 8b, of the Section 401 Water Quality Certification Application Supplemental Information.

c) **Dredging: Total** volume (cubic yards) of dredged material proposed for project.
N/A

d) Provide information on the Q_2, Q_{10}, Q_{100} for pre- and post-project implementation.
See Section 6, Block 8d, of the Section 401 Water Quality Certification Application Supplemental Information.

e) Indicate type(s) of material proposed to be discharged in waters of the United States:
See Section 6, Block 8e, of the Section 401 Water Quality Certification Application Supplemental Information.

[2]Both US Army Corps of Engineer's jurisdictional- and non-jurisdictional water bodies.
[3]Per US Army Corps of Engineer's wetland delineation protocol.

9. COMPENSATORY MITIGATION (Please complete attached Mitigation Checklist)

a) Is compensatory mitigation proposed? Yes ___X___ No

b) Indicate in ACRES and LINEAR FEET (where appropriate) the total quantity of **waters of the United States** proposed to be Created, Restored, Enhanced, or Preserved.

Water Body Type	Created	Restored	Enhanced	Preserved
Wetland	Note 1.			
Streambed				
Lake/Reservoir				
Ocean/Estuary/Bay				
Riparian				
Non-Federal Waters				

Note 1: See November 2013 Draft Compensatory Mitigation Plan (CMP). Mitigation sites and associated acreage numbers will be included once finalized. Updated versions of the CMP will be provided to the SWRCB as developed).

c) If contributing to a Mitigation Bank provide the following: See November 2013 Draft CMP

Mitigation Bank Name: TBD
Name of Mitigation Bank Operator: : TBD
Office Address of Operator/Phone Number: TBD
Mitigation Bank Location (Latitude/Longitude, County, and City): : TBD
Mitigation Bank Water Body Type(s): : TBD
Mitigation Area (acres or linear feet) and cost (dollar): : TBD

d) Provide/attach a map with suitable detail, quality, and scale (1:24K) that will easily provide information as to the location(s) and water body(ies) of the mitigation area.

See November 2013 Draft CMP, Appendix C (provided on the CD-ROM accompanying this application).

10. THREATENED/ENDANGERED SPECIES

a) Does the project require coordination with the US Fish and Wildlife Service or National Marine Fisheries Service under the Federal Endangered Species Act?

Yes __X__ (provide copies of Biological Report) No ____ (provide basis of determination)

See Section 8, Threatened and Endangered Species, of the Section 401 Water Quality Certification Application Supplemental Information and Other Requisite Material provided on CD-ROM (NMFS No Effect Determination Letter, USFWS BO, and Fresno to Bakersfield Section Biological Assessment).

b) Does the project require coordination with the State of California Department of Fish and Game under the California Endangered Species Act?

Yes __X__ (provide copies of Biological Report) No ____ (provide basis of determination)

See Section 8, Threatened and Endangered Species, of the Section 401 Water Quality Certification Application Supplemental Information and Other Requisite Material provided on CD-ROM (Section 2081 Incidental Take Permit).

11. OTHER ACTIONS/BEST MANAGEMENT PRACTICES (BMPs)

Briefly describe other actions/BMPs to be implemented to Avoid and/or Minimize impacts to waters of the United States, including preservation of habitats, erosion control measures, project scheduling, flow diversions, etc.

BMPs relevant to and included in this application were developed to minimize impacts on water quality and biological resources/habitats associated with watercourses to be crossed by the PP1 HST Project. Measures to be implemented as part of the HST Project related to avoidance periods associated with sensitive biological resources life stages are incorporated as part of the overall project schedule. Construction phase BMPs will be implemented to minimize construction-related water quality impacts, especially due to erosion and sediment transport in stormwater runoff. Implementation of these BMPs will be based on site-specific requirements as determined by the Qualified SWPPP Developer and/or Qualified SWPPP Practitioner. The Construction SWPPP will include measures to address erosion and sediment-control BMPs, source control BMPs, non-stormwater management, and post-construction BMPs.

See Section 9, Other Actions and Best Management Practices, of the Section 401 Water Quality Certification Application Supplemental Information.

12. PAST/FUTURE PROPOSALS BY THE APPLICANT

Briefly list/describe any projects carried out in the last 5 years or planned for implementation in the next 5 years that are in any way related to the proposed activity or may impact the same receiving body of water. Include estimated adverse impacts.

See Section 10, Past and Future Proposals, of the Section 401 Water Quality Certification Application Supplemental Information.

Applicant's Signature (or Agent) Date

For further information please email:
http://www.swrcb.ca.gov/water_issues/programs/cwa401/docs/staffdirectory.pdf

STATE WATER RESOURCES CONTROL BOARD

CLEAN WATER ACT §401 WATER QUALITY CERTIFICATION APPLICATION SUPPLEMENTAL INFORMATION

Table of Contents

Page

Attachments (all on disk)

Tables

Figures

Acronyms

Authority	California High-Speed Rail Authority
BMPs	Best Management Practices
BO	Biological Opinion
Caltrans	California Department of Transportation
CMMP	Comprehensive Mitigation and Monitoring Plan
CDFW	California Department of Fish and Wildlife
CEQA	California Environmental Quality Act
CMP	Compensatory Mitigation Plan
CP	Construction Package
CRAM	California Rapid Assessment Method
CIP	Cast-in-place
CVFPB	Central Valley Flood Protection Board
CWA	Clean Water Act
D/B	design/build
EIR/EIS	Environmental Impact Report/Environmental Impact Statement
EPA	U.S. Environmental Protection Agency
ERA	Environmentally Restricted Areas
ESA	Endangered Species Act
ESAs	Environmentally Sensitive Areas
FRA	Federal Railroad Administration
HMF	Heavy Maintenance Facility
HST	High-Speed Train
HU	hydrologic units
MMRP	Mitigation Monitoring and Reporting Program
mph	miles per hour
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service

NPDES	National Pollutant Discharge Elimination System
PP1	Permitting Phase 1
RWQCB	Regional Water Quality Control Board
SHPO	State Historic Preservation Officer
SR	State Route
SWPPP	Storm Water Pollution Prevention Plan
SWRCB	State Water Resources Control Board
TBD	To be determined
USACE	U.S. Army Corps of Engineers
USFWS	United States Fish and Wildlife Service

Section 1
Document Organization

Section 1 Introduction and Document Organization

The California High-Speed Rail Authority (Authority) is seeking SWRCB approvals for the construction and operation of the Initial Construction Segment, Permitting Phase 1 (PP1), of the Fresno to Bakersfield Section of the High-Speed Train (HST) Project. In the Fresno to Bakersfield Section, initial construction is planned to commence by October 2014 and will include the area from Monterey Street in Fresno County to 7th Standard Road in Kern County.

The Authority proposes to construct, operate, and maintain an electric-powered HST system in California. When completed, the nearly 800-mile train system would provide new passenger rail service to more than 90% of the state's population. The HST would be capable of operating speeds of up to 220 miles per hour (mph), with state-of-the-art safety, signaling, and automated train control systems. The system would connect and serve the major metropolitan areas of California, extending from San Francisco and Sacramento in the north to San Diego in the south. The Fresno to Bakersfield HST project section would connect a Fresno station, a Kings/Tulare Regional station in the Hanford/Visalia/Tulare area, and a Bakersfield station. The planned HST line north of the Fresno to Bakersfield Section would extend to Merced. A planned HST line west of the Merced to Fresno Section is through the Pacheco Pass, connecting the San Francisco to San Jose HST project to the Central Valley and the rest of the HST System. South of the Bakersfield Station, the HST line would continue to Los Angeles via Palmdale.

The organization of this document follows the format of the State Water Resources Control Board (SWRCB) Clean Water Act (CWA) Section 401 Water Quality Certification Application. The following sections present additional documentation for specific blocks in the application form. Any blocks excluded from the numerical order listed below are addressed on the Water Quality Certification Application.

- Section 1 – Introduction and Document Organization
- Section 2 – Block 2: Project Description
  - Block 2b: Project Purpose
  - Block 2c: Project Activities
    - Project Description
    - Water Feature Crossing Approach
  - Block 2d: Proposed Schedule
- Section 3 – Blocks 3 and 4: Federal Licenses/Permits and Other Licenses/Permits/ Agreements
  - U.S. Army Corp of Engineers (USACE) Section 404 Individual Permit for the Fresno to Bakersfield Section, PP1
  - USACE Section 408 Determination
  - California Department of Fish and Wildlife (CDFW) California Fish and Game Code § 1602 Master Lake or Streambed Alteration Agreement
  - SWRCB National Pollutant Discharge Elimination System (NPDES) General Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activities [Order No. 2009-0009-DWQ; as amended by 2010-0014-DWQ and 2012-0006-DWQ; NPDES No. CAS000002] (Construction General Permit)
  - CDFW California Fish and Game Code § 2081 Incidental Take Permit
  - Central Valley Flood Protection Board (CVFPB) Encroachment Permit

- SWRCB Water Quality Order No. 2003-0003-DWQ, Statewide General Waste Discharge Requirements for Discharges to Land with Low Threat to Water Quality.
- Regional Water Quality Control Board – Central Valley Region (Central Valley RWQCB), Order No. R5-2013-0074, Waste Discharge Requirements for Dewatering and Other Low Threat Discharges to Surface Water.
- California Department of Transportation (Caltrans) Encroachment Permit

- Section 4 – Block 5 California Environmental Quality Act (CEQA)
- Section 5 – Block 7: Project Site Description
  - Block 7a: Project Location
  - Block 7c: Site Description of the Entire Project Area
- Section 6 – Block 8: Waterbody Impact
  - Block 8a: Waterbody Names
  - Block 8d: Runoff for Pre- and Post-Project Implementation
  - Block 8e: Type of Materials Discharged to Waters of the United States
- Section 7 – Block 9: Compensatory Mitigation
  - Block 9d: Map of Mitigation Areas
- Section 8 – Block 10: Threatened and Endangered Species
  - Block 10a: National Marine Fisheries Service (NMFS) No Effect Determination Letter, June 24, 2011
  - Block 10a: U.S. Fish and Wildlife Service (USFWS) Biological Opinion (BO), February 28, 2013, to be amended spring 2014
  - Block 10b: CDFW Incidental Take Permit
- Section 9 – Block 11: Other Actions/Best Management Practices (BMPs)
- Section 10 – Block 12: Past and Future Proposals by the Applicant
- Section 11 – References

In addition, the following attachments and other requisite material are provided:

Attachments (all on CD-ROM only)

1 Project Description

2 Design Drawings and Typical Cross-Sections (December 2013)

3 Post-Construction Stormwater Quality Standards and Water Quality Technical Report

4 Impacted Waterbodies in the PP1 Study Area

5 Project Impact Mapbook

Other Requisite Material (all on CD-ROM only)

Fresno to Bakersfield Project Section, Preliminary Jurisdictional Waters and Wetlands Delineation Report (June 2011)

Draft Compensatory Mitigation Plan (Draft CMP) (November 2013)

USACE Section 404 Individual Permit Application, Permitting Phase 1 (Final, January 2014)

CDFW Section 1602 Master Streambed Alteration Agreement Permit Application, Permitting Phase 1 (March 2014)

CDFW Section 2081 Incidental Take Permit Application (April 2014)

Federal Clean Water Act Section 408 Determination Application (to be determined, TBD)

USACE and EPA Concurrence Letters for Checkpoints A, B, and C (January/February 2011, June/July 2011, December 2013)

USACE Preliminary Jurisdictional Determination and Verification Letter (February 2013)

Fresno to Bakersfield Section, Permitting Phase 1, Standard Operating Procedure and Habitat Mitigation Plan or Conceptual Approach (spring or summer 2014)

Fresno to Bakersfield Section USFWS BO (February 2013, to be amended spring 2014)

Fresno to Bakersfield Section NMFS No Effect Determination Letter (June 2011)

Fresno to Bakersfield Section Final Project Environmental Impact Statement/Environmental Impact Report (In preparation, spring 2014)

Fresno to Bakersfield Section Record of Decision (spring 2014)

Fresno to Bakersfield Section Notice of Determination (spring 2014)

This page intentionally left blank

RFP No.: 13-57 – Addendum No. 5 - 10/09/2014

Section 2
Project Description

Section 2 Block 2: Project Description

(Also see Section 5, Block 7c - Site Description of the Entire Project Area, for additional information related to the project description.

Block 2b: Project Purpose

The purpose of this project is to construct, operate, and maintain the Fresno to Bakersfield Section of the California High Speed Train (HST) system to provide the public with electric-powered high-speed rail service that provides predictable and consistent travel times between major urban centers and connectivity to airports, mass transit systems, and the highway network in the South San Joaquin Valley, and to connect the northern and southern portions of the proposed system.

The California High-Speed Rail Authority (Authority) and Federal Railroad Administration (FRA) propose to construct, operate, and maintain the HST system in California. When completed, the nearly 800-mile train system would provide new passenger rail service to more than 90 percent of the state's population. The HST would be capable of operating at speeds of up to 220 miles per hour (mph), with state-of-the-art safety, signaling, and automated train control systems. At final build-out, the system would connect and serve the major metropolitan areas of California, extending from San Francisco and Sacramento in the north to San Diego in the south.

Block 2c: Project Activities

2c-1 Project Description

The Fresno to Bakersfield Section of the HST Project consists of one preferred alignment from the Downtown Fresno Station to the Downtown Bakersfield Station, a distance of approximately 114 miles. At this time, the Authority is only seeking regulatory agency approvals for the first approximately 100 miles of the preferred alignment. This Initial Construction Segment of the overall Project is referred to as Permitting Phase 1 (PP1) of the Fresno to Bakersfield Section.

The construction of PP1 of the Fresno to Bakersfield Section is planned to commence in October 2014 and will include the area from Monterey Street near State Route (SR) 41 in the city of Fresno to 7th Standard Road, near Crome in Kern County. The Authority is seeking SWRCB approvals for this initial construction and operation of PP1 of the Fresno to Bakersfield Section of the HST Project. PP1 spans portions of the South Valley Floor watershed (Figure 2-1). Subwatersheds crossed by the Fresno to Bakersfield alignment include the Fresno, Consolidated, Raisin, Hanford-Lemoore, Kaweah Delta, Lake Sump, Tule Delta, Semitropic, and North Kern hydrologic areas.

The HST System includes the HST tracks, structures, stations, traction power substations, maintenance facilities, and train vehicles. The HST would use four different track types. These track types have varying profiles: low, near-the-ground tracks are at grade, higher tracks can be elevated by either a structure or on a retained fill platform, and below-grade tracks are in a retained cut. The type of bridges that might be built includes full channel spans, large box culverts, or, for some larger river crossings, piers within the ordinary high-water channel. The track structure would consist of either a direct fixation system (with track, rail fasteners, and slab), or ballasted track, depending on local conditions. Additional information on track design and traction power substations is provided in Attachment 1, Project Description.

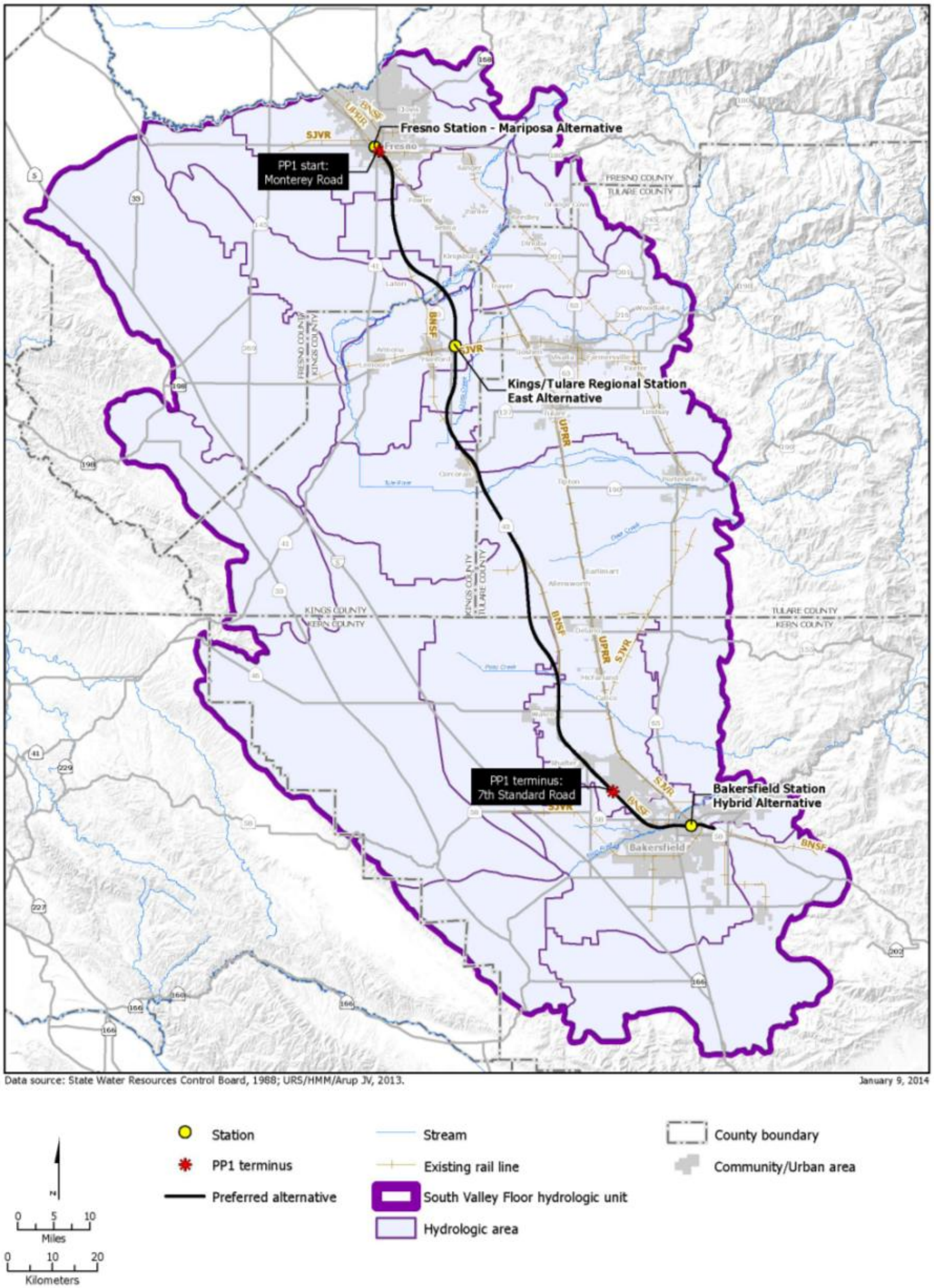


Figure 2-1
PP1 Overview

RFP No.: 13-57 – Addendum No. 5 - 10/09/2014

The HST Fresno to Bakersfield Section, including PP1, will be built using a design/build (D/B) approach, which is a method of project delivery where one entity works under a single contract with the project owner to provide design and construction services. The contract with the D/B contractor will require compliance with standard development practices and regulations as well as implementation of any project design features and all applicable conservation measures, mitigation measures, and permit conditions. After selecting a D/B contractor for PP1, the Authority will start right-of-way acquisition and procure a separate construction management services contract to oversee physical construction of the project. Construction activities may occur at multiple points along PP1, depending on negotiations with property owners, agreements with utility owners, and status of environmental clearances. Construction of PP1 would commence in 2014 and be completed in 2017. PP1 is consistent with and does not preclude selection of any of the heavy maintenance facility (HMF) alternatives that are being evaluated in the San Jose to Merced, Merced to Fresno, and Fresno to Bakersfield Section state and federal environmental review documents. However, PP1 does not include the HMF.

FRA and Authority intend to obtain permits for all of PP1. For purposes of the numerous contracts necessary to construct the HST project, PP1 has been sub-divided into multiple Construction Packages (CPs). Descriptions of CP 1C, CP 2/3, and CP 4 are as follows.

- CP 1C is the portion of CP 1 that occurs from just south of the Fresno Station to East American Avenue. Located completely within the metropolitan Fresno area, it is approximately 5 miles long.
- CP 2/3 extends from East American Avenue to 1 mile north of the Tulare/Kern County Line. This construction package crosses Fresno, Kings, and Tulare Counties and is approximately 63 miles long.
- CP 4 is the final construction package in PP1. The limits of CP 4 are from the end of CP 2/3 to 7th Standard Road. The southern terminus of PP1 and CP 4 coincide at 7th Standard Road.

The CPs are shown on Figure 2-2.

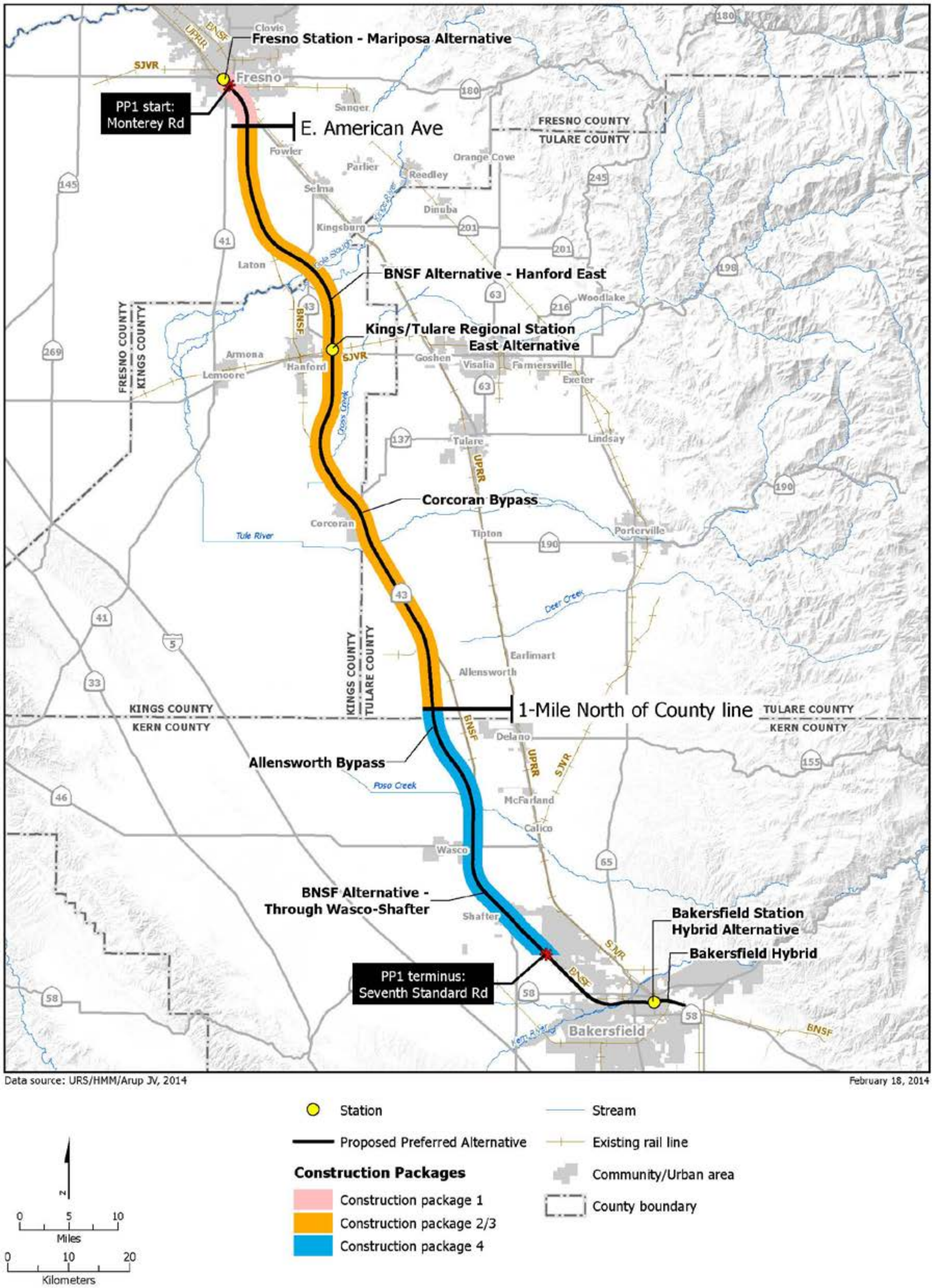


Figure 2-2
Construction Packages

RFP No.: 13-57 – Addendum No. 5 - 10/09/2014

2c-2 Project Footprint

The project components of PP1 of the Fresno to Bakersfield Section include the HST track alignment, footprint, and associated project facilities, as well as operation and maintenance of PP1. PP1 includes only one of the stations discussed in the EIR/EIS – the Kings/Tulare Regional Station–East Station and does not include the HMF. The Fresno Station will be permitted under the Merced to Fresno Section. The Bakersfield Station will be permitted under a different permitting phase. The HMF will be permitted after the selection of the HMF location.

The alignment for PP1 starts south of SR 41 adjacent to Monterey Street in the north (coordinates 36°43'25.66"N and 119°47'3.50"W) and ends in the south at the intersection of 7th Standard Road and SR 43 in the unincorporated community of Crome in Kern County (coordinates 35°44’16.35"N and 119°19’88.06"W). The alignment for PP1 traverses the urban downtown area of the City of Fresno and moves south into rural Fresno, Kings, Tulare, and Kern Counties. Approximately 17 miles of track would be in Fresno County. The alignment in Fresno County would be at-grade with bridges where it crosses Cole Slough and the Kings River Complex into Kings County to the east of Laton.

Approximately 30 miles of PP1 would be in Kings County. A total of 5.5 miles of track in Kings County would be elevated over the San Joaquin Valley Railroad and SR 198, Cross Creek, and portions of the BNSF Railroad right-of-way.

PP1 crosses approximately 25 miles of Tulare County. The majority of the alignment through Tulare County would be at-grade, with only a combined total of 2 miles elevated where the alignment crosses, first, the Tule River, and then both the Alpaugh railroad spur from the BNSF Railway and Deer Creek.

PP1 would cross approximately 30 miles of Kern County. Within this portion of the alignment, approximately 27 miles would be at-grade, while the remainder of the alignment would be elevated. PP1 is designed to follow the existing BNSF Railway corridor as closely as practicable, except where bypasses were developed to avoid and minimize impacts on aquatic resources and other preservation features, and where minor deviations from the BNSF Railway route are necessary to accommodate design requirements.

The PP1 construction footprint includes the HST right-of-way and associated project facilities (e.g., the Kings/Tulare Regional Station, traction power substations) and the shifts in roadway rights-of-way associated with those facilities, including overcrossings and interchanges that would be modified to accommodate the HST project. Table 2-1 summarizes project features in PP1.

Construction of PP1 of the Fresno to Bakersfield Section would include both permanent and temporary project components. Project components with permanent effects include the HST tracks, station (Kings/Tulare Regional Station–East), traction power sub-stations, interlocking sites, maintenance of way, maintenance of infrastructure, roadway overpasses and underpasses, access roads, radio sites, drainage basins, canal relocation areas, freight rail relocation areas, and BNSF yard relocation areas. Project components with temporary effects include temporary construction easements, track access easements, utility easements, utility relocation areas, natural gas line relocation areas, petroleum line relocation areas, transmission line relocation areas, water line relocation areas, temporary construction areas, and areas with base and surfacing removal. The combined total area for the proposed components of PP1 is 5,900 acres. These project components are shown in Figure 2-3, Sheets 1 to 16.

Table 2-1
Design Features in PP1 Alignment

Design Feature	CP 1C	CP 2 / 3	CP 4	PP1
	Number			
Total Length (linear miles)	5	63	31	99
At-grade profile (linear miles)[a]	3	54	26	83
Below-grade profile (linear miles)	1	0	0	1
Elevated profile (linear miles)	1	9	5	15
Number of major water crossings	0	6	1	7
Number of roadway overcrossings and undercrossings	2	32	9	43
Number of dedicated wildlife crossing structures	0	70	33	103
Kings/Tulare Regional Station–East	0	1	0	1
Maintenance of way or Maintenance of infrastructure facilities	0[b]	2	0	2

[a] The linear miles of at-grade tracks includes the retained fill profile tracks.
[b] Although the majority of the maintenance of infrastructure facility is located within CP 2/3, the northern extent of the facility is located in CP 1C.

RFP No.: 13-57 – Addendum No. 5 - 10/09/2014

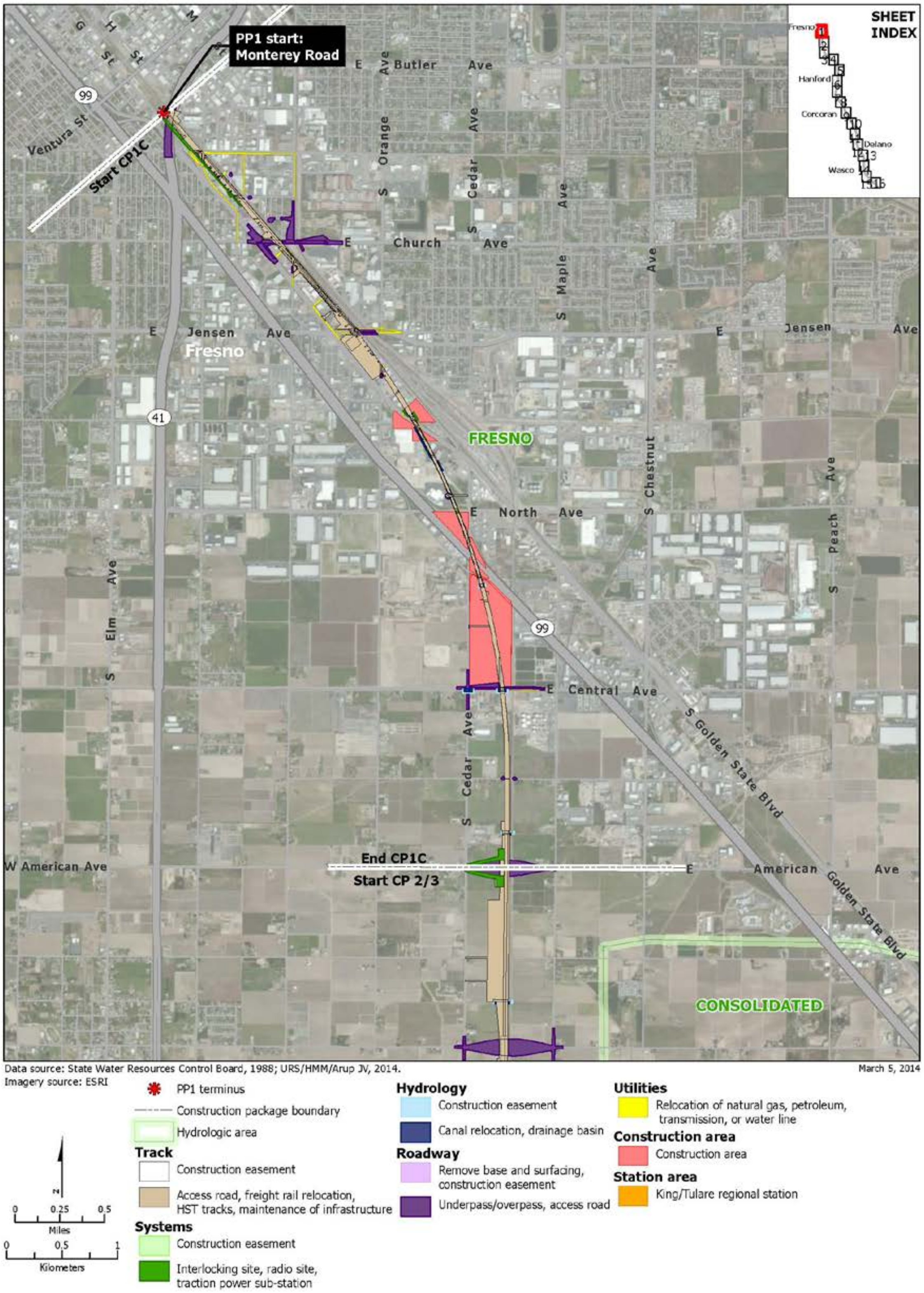


Figure 2-3
PP1 alignment construction elements
Sheet 1 of 16

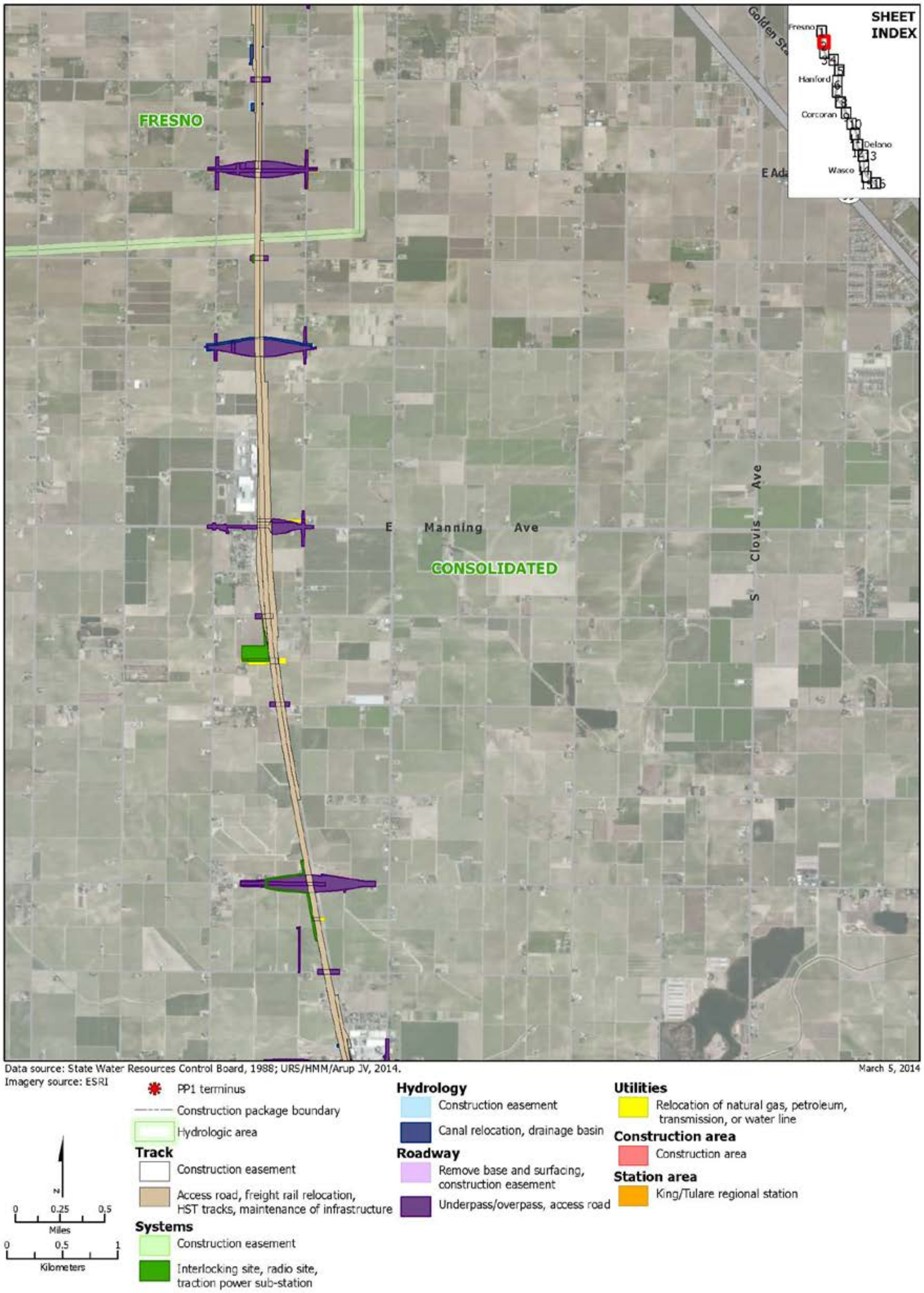


Figure 2-3
PP1 alignment construction elements
Sheet 2 of 16

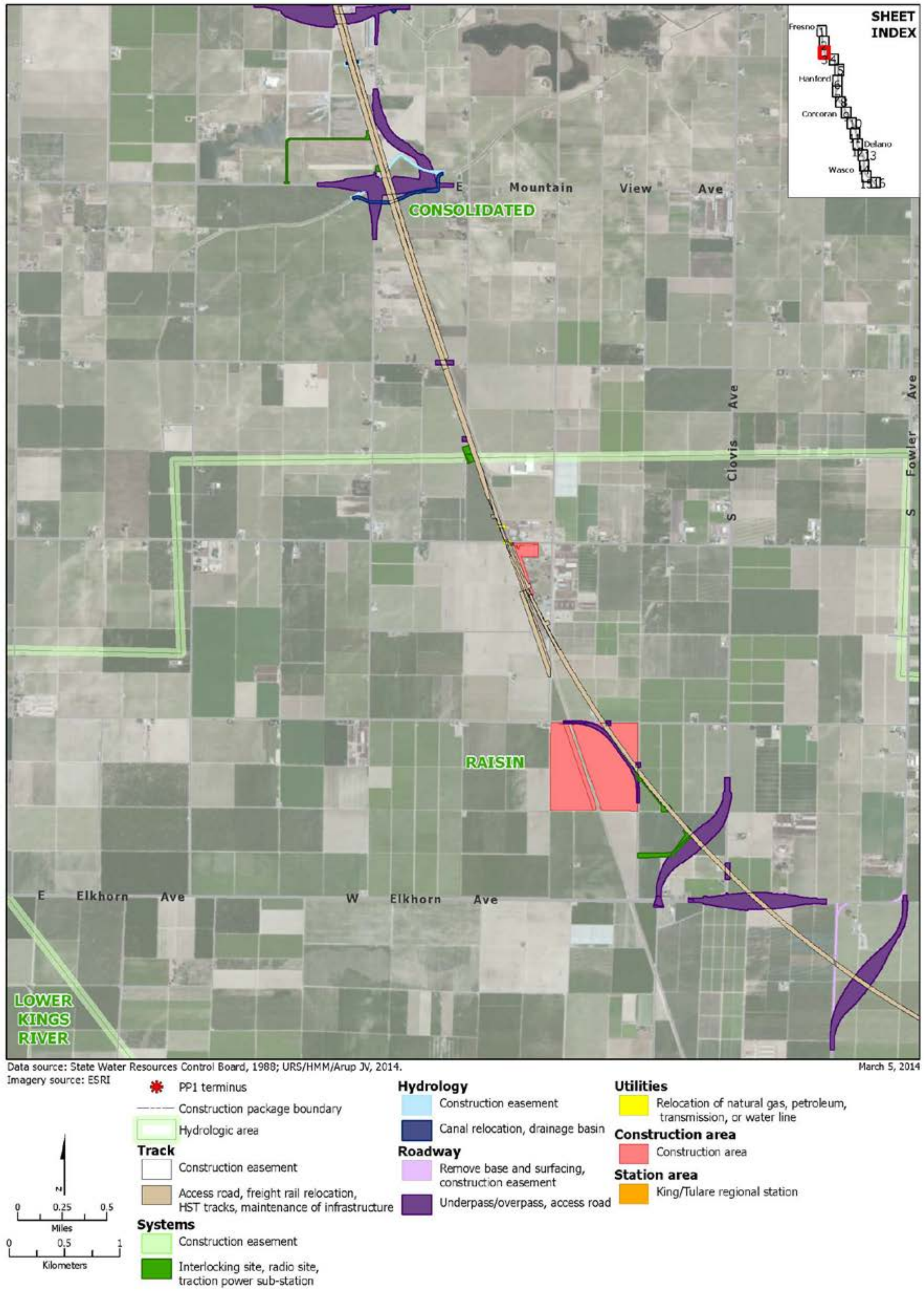


Figure 2-3
PP1 alignment construction elements
Sheet 3 of 16

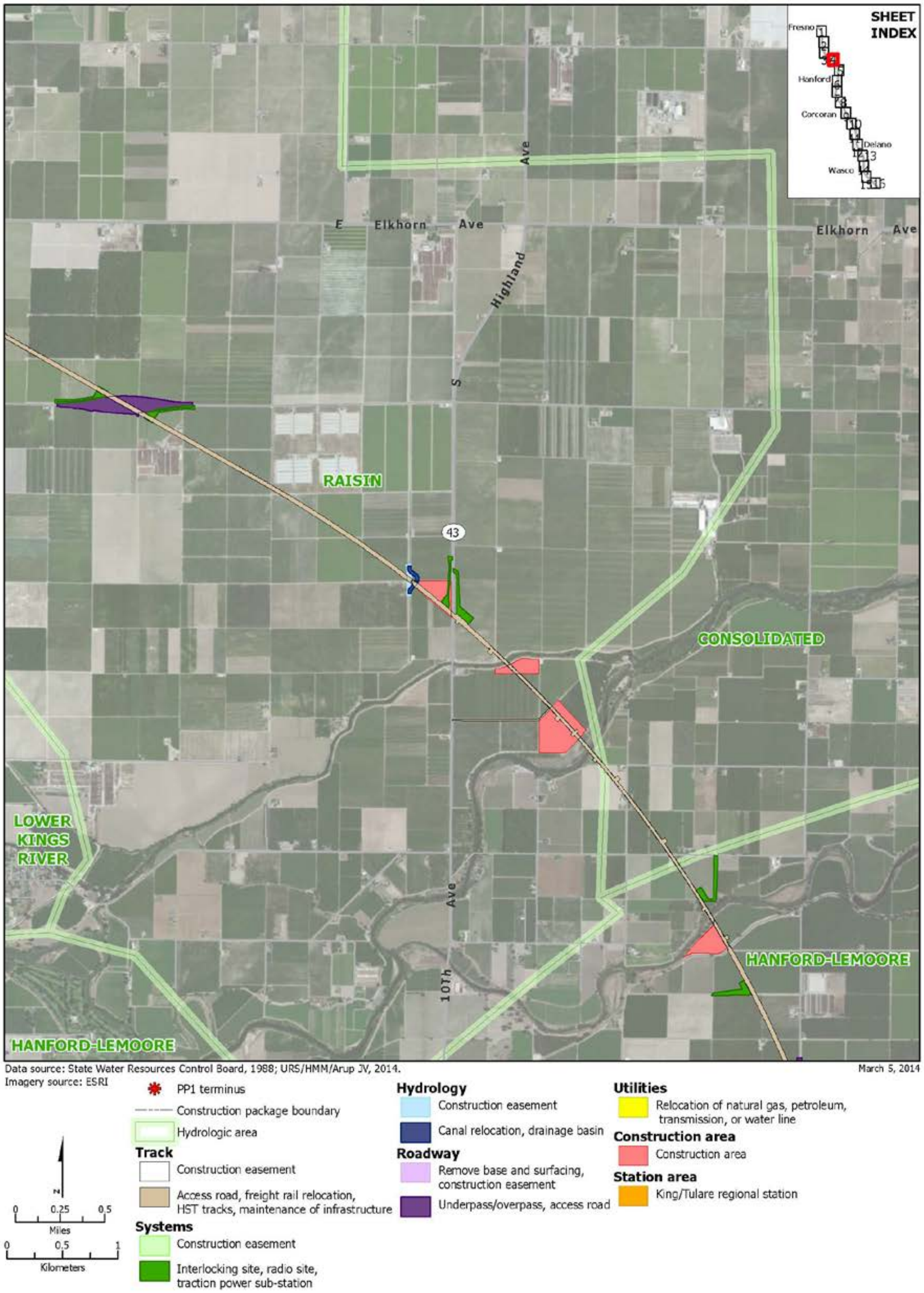


Figure 2-3
PP1 alignment construction elements
Sheet 4 of 16

RFP No.: 13-57 – Addendum No. 5 - 10/09/2014

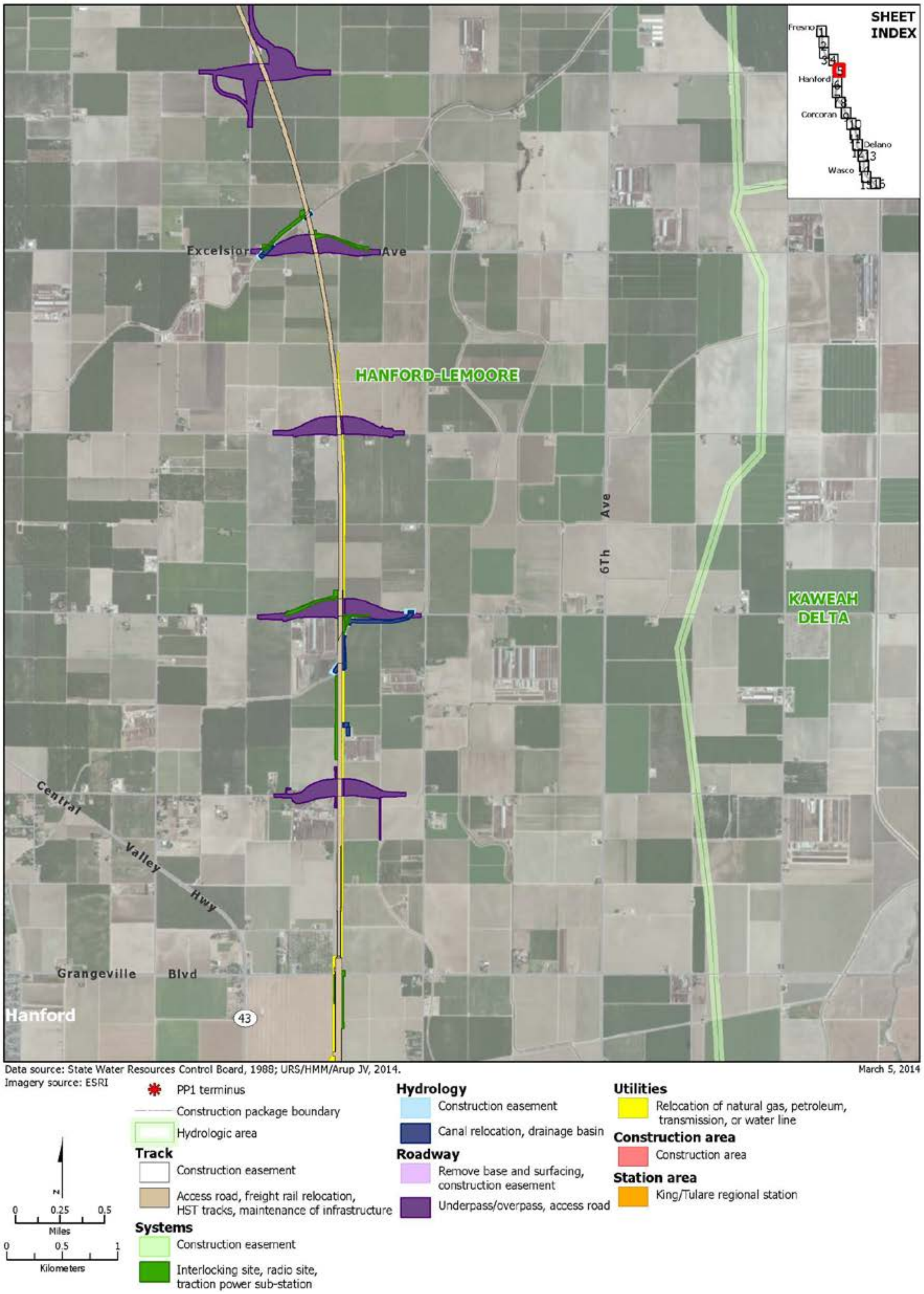


Figure 2-3
PP1 alignment construction elements
Sheet 5 of 16

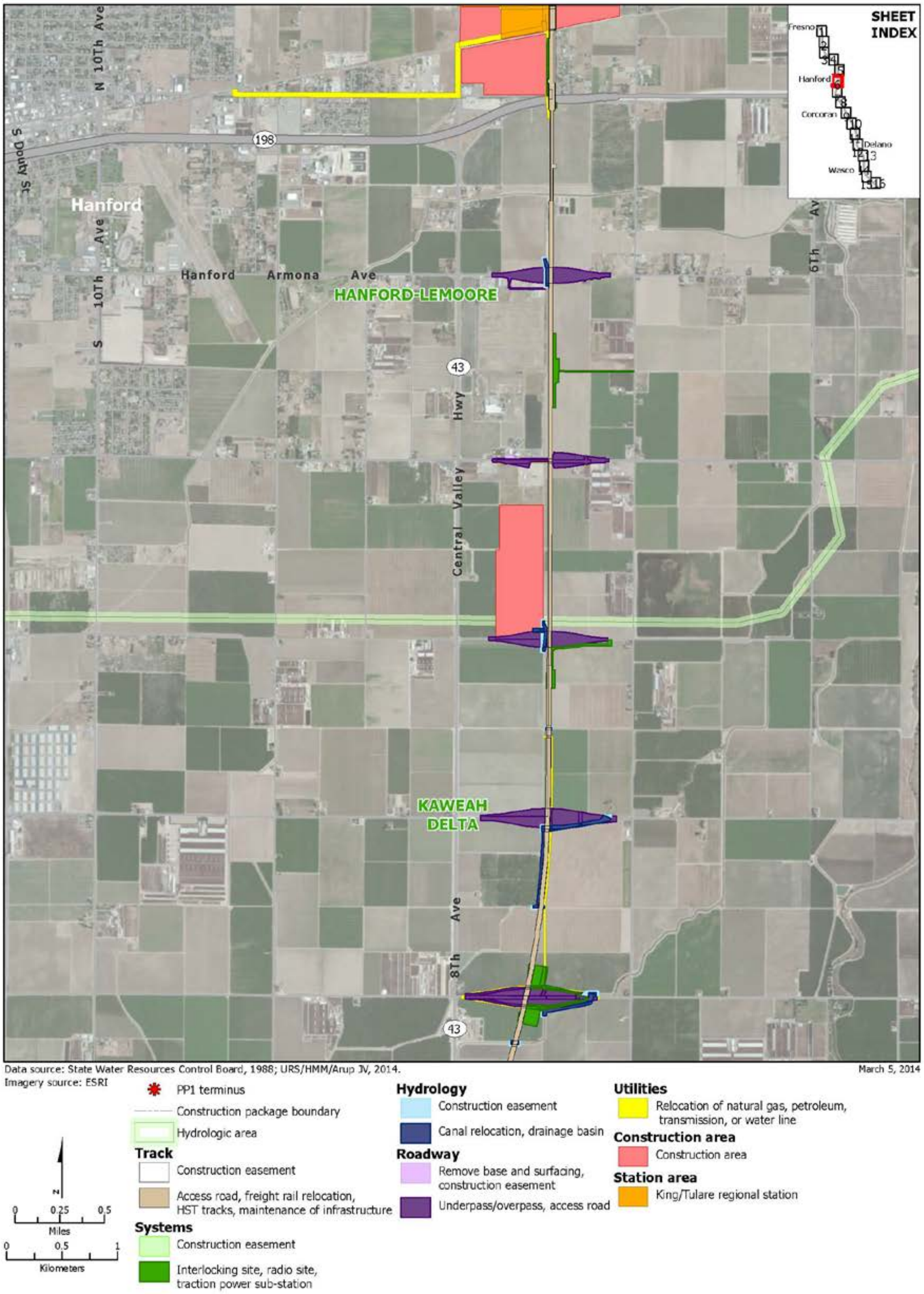


Figure 2-3
PP1 alignment construction elements
Sheet 6 of 16

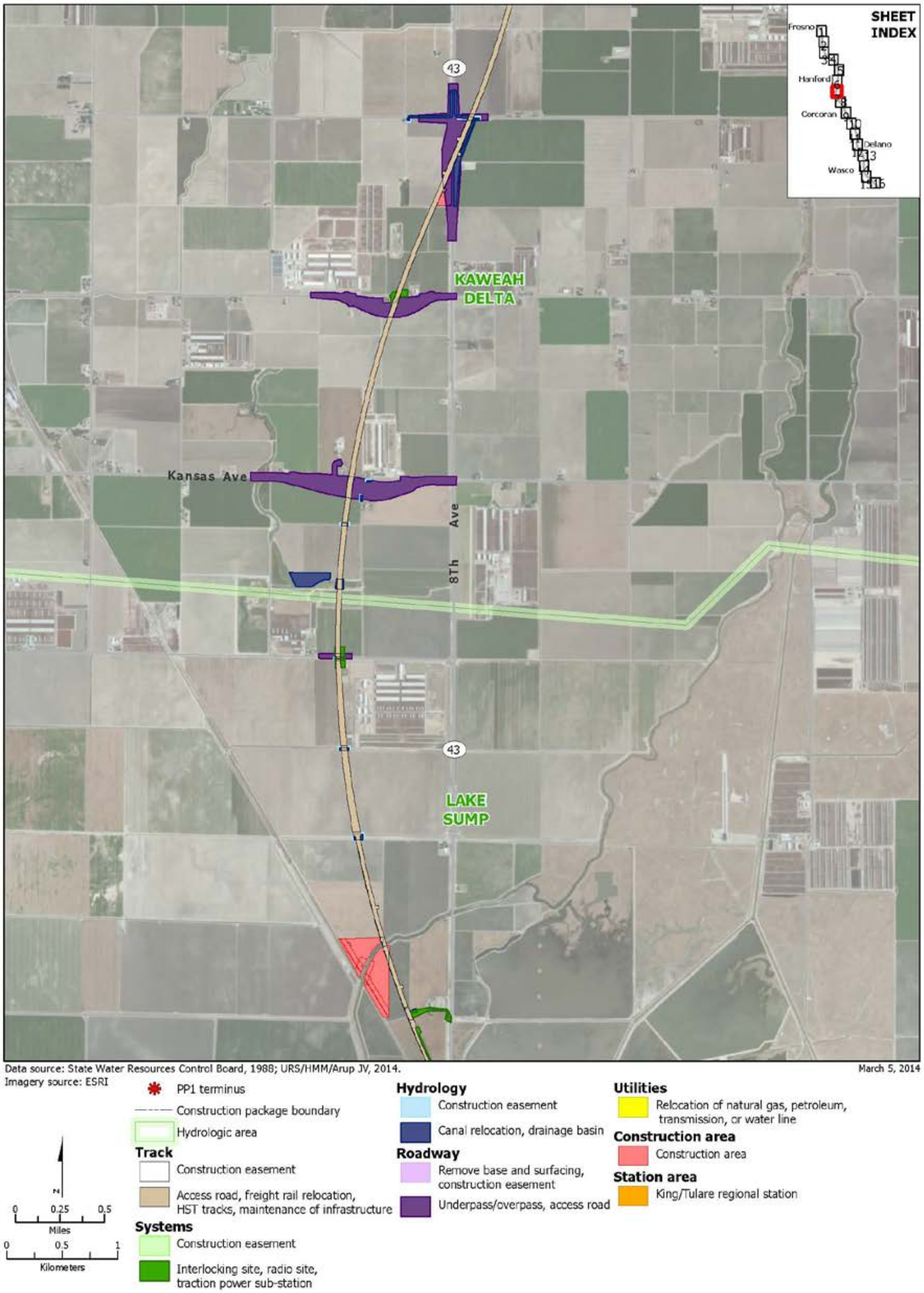


Figure 2-3
PP1 alignment construction elements
Sheet 7 of 16

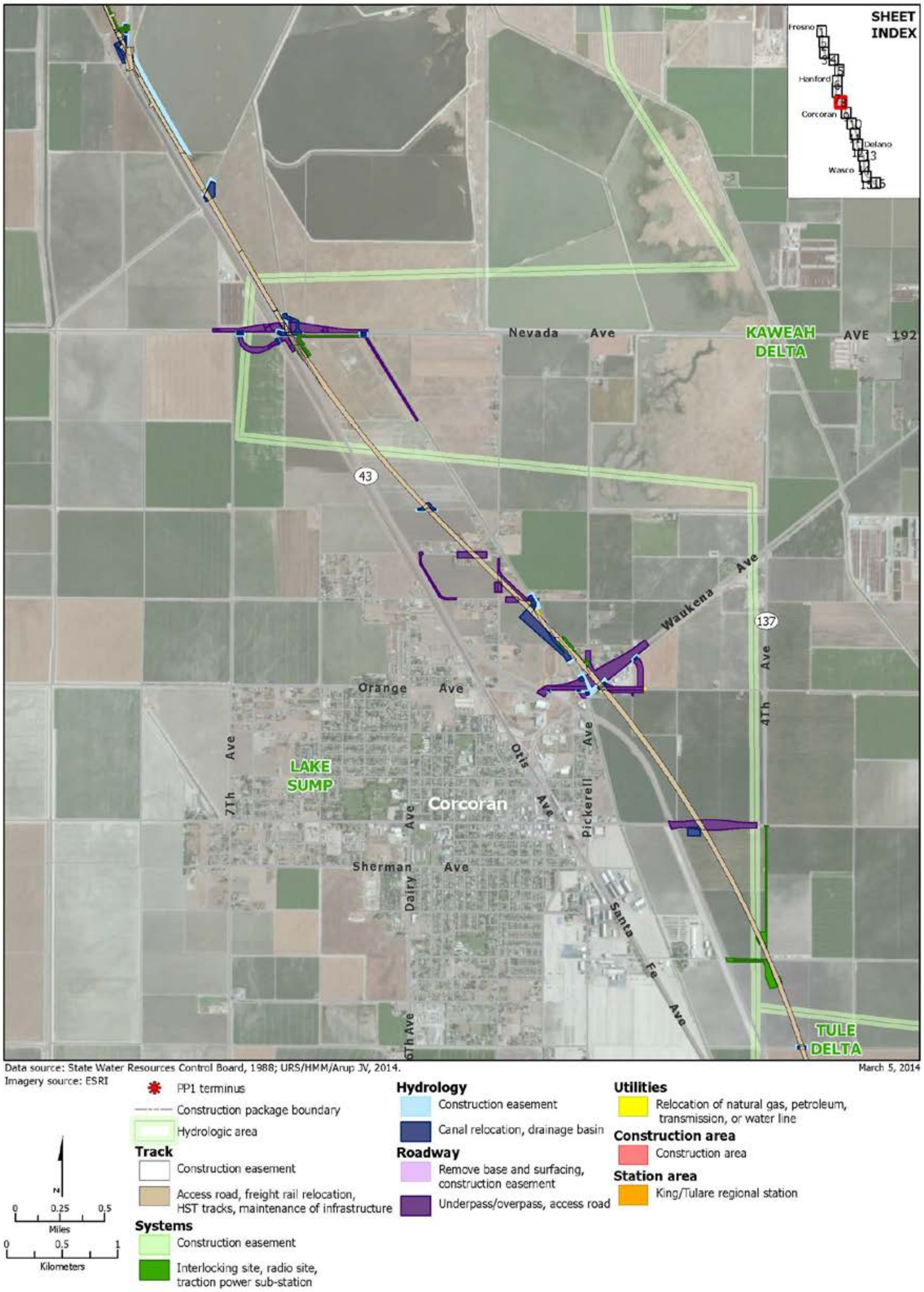


Figure 2-3
PP1 alignment construction elements
Sheet 8 of 16

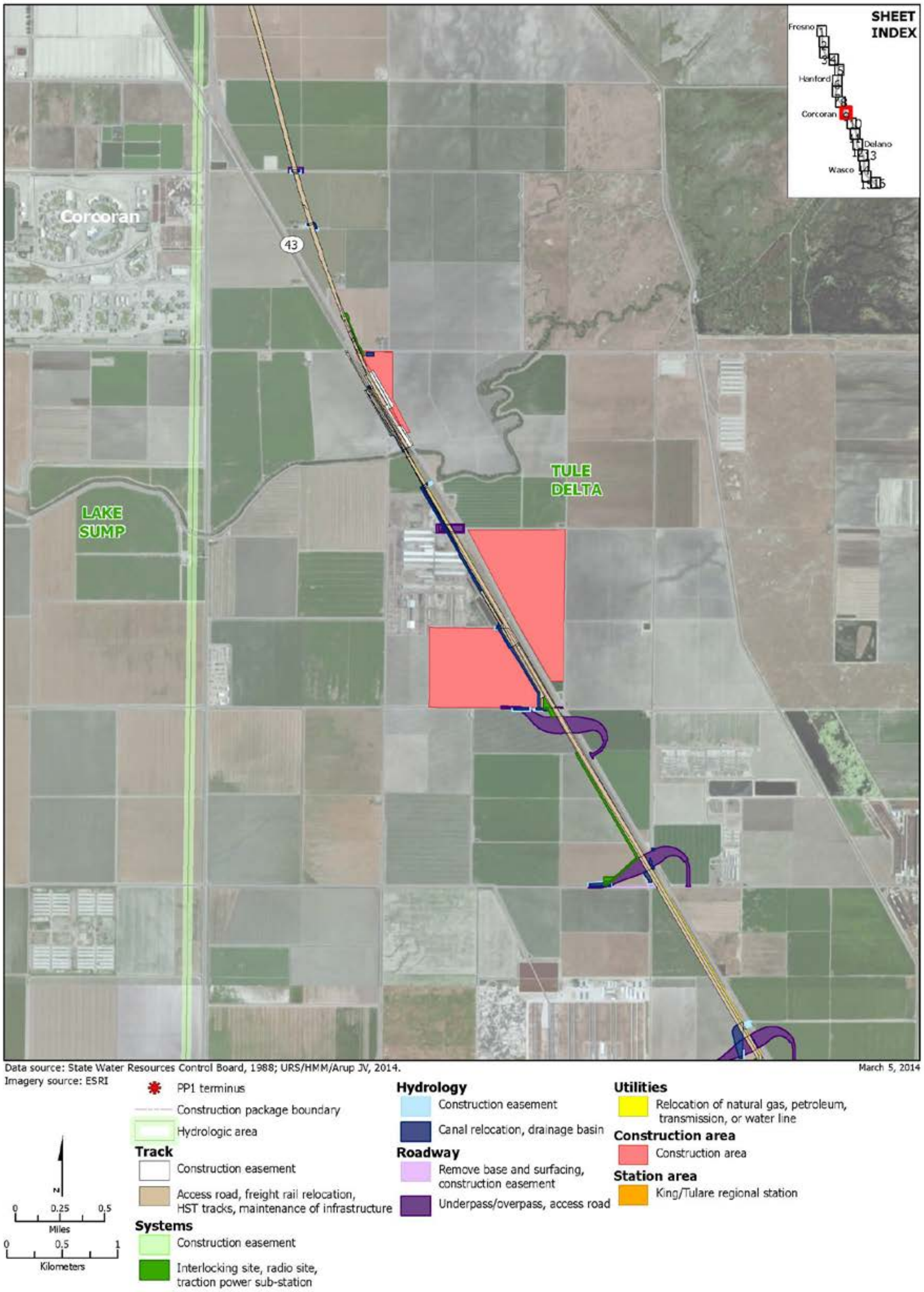


Figure 2-3
PP1 alignment construction elements
Sheet 9 of 16

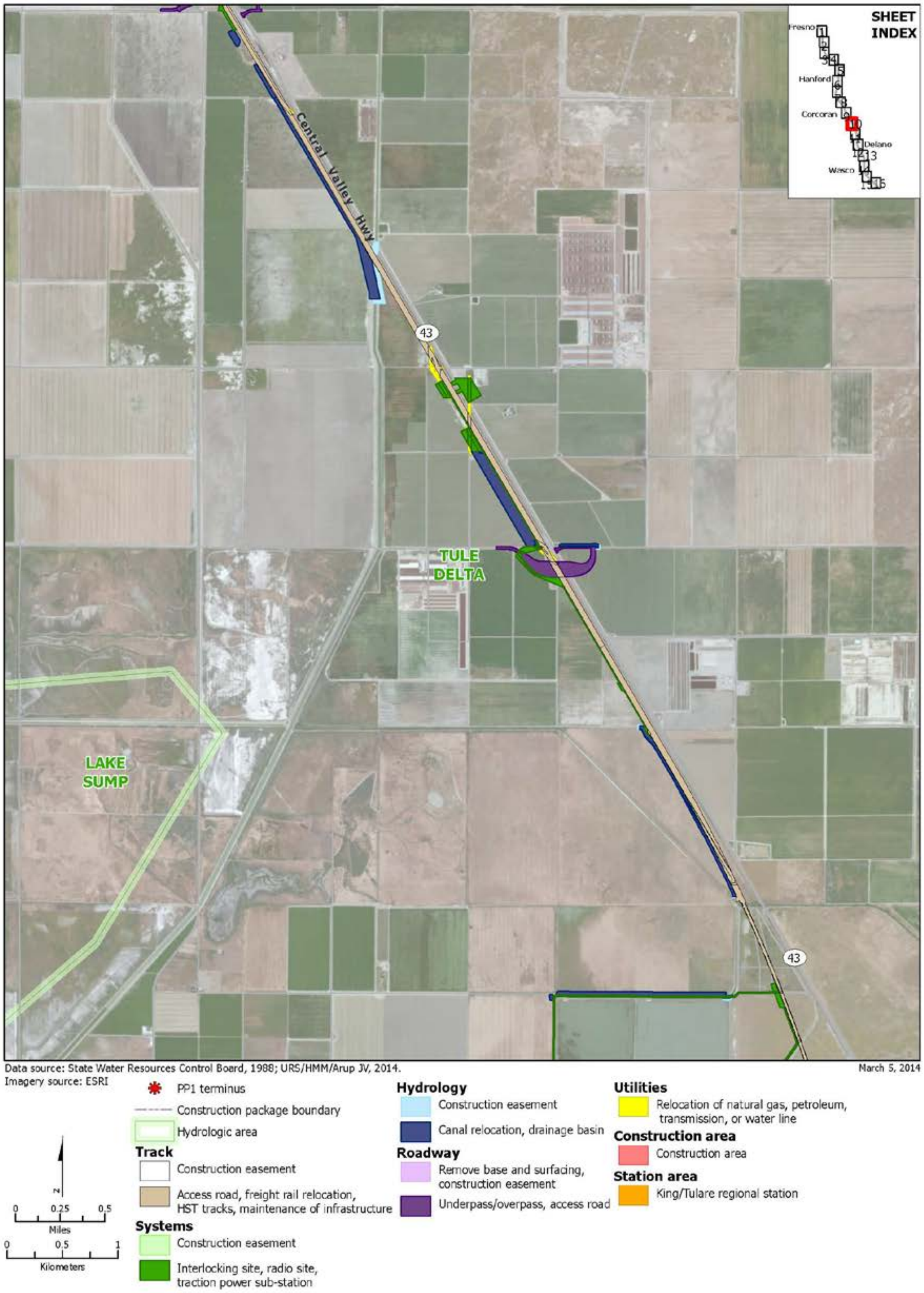


Figure 2-3
PP1 alignment construction elements
Sheet 10 of 16

RFP No.: 13-57 – Addendum No. 5 - 10/09/2014

CALIFORNIA High-Speed Rail Authority
U.S. Department of Transportation Federal Railroad Administration

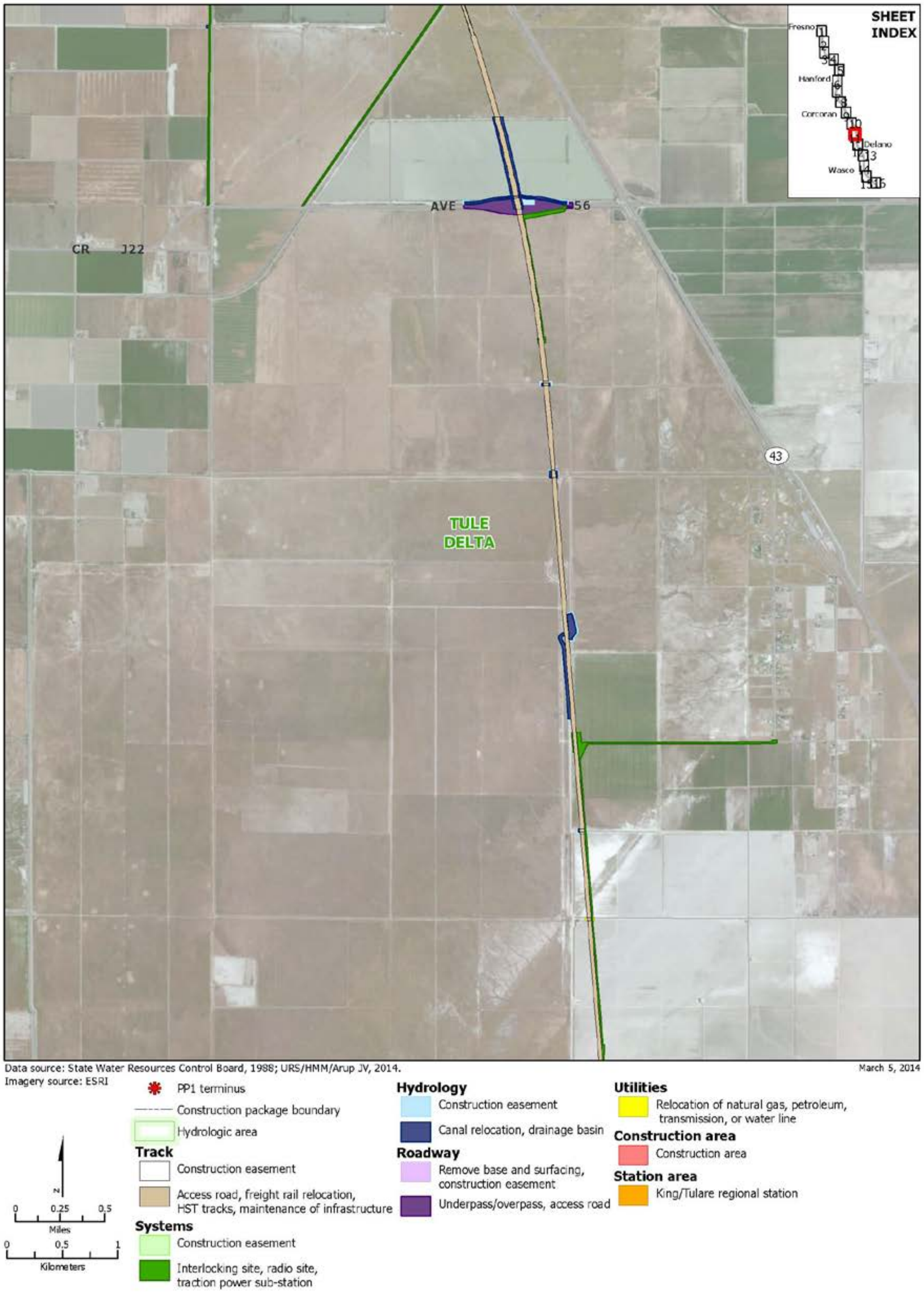


Figure 2-3
PP1 alignment construction elements
Sheet 11 of 16

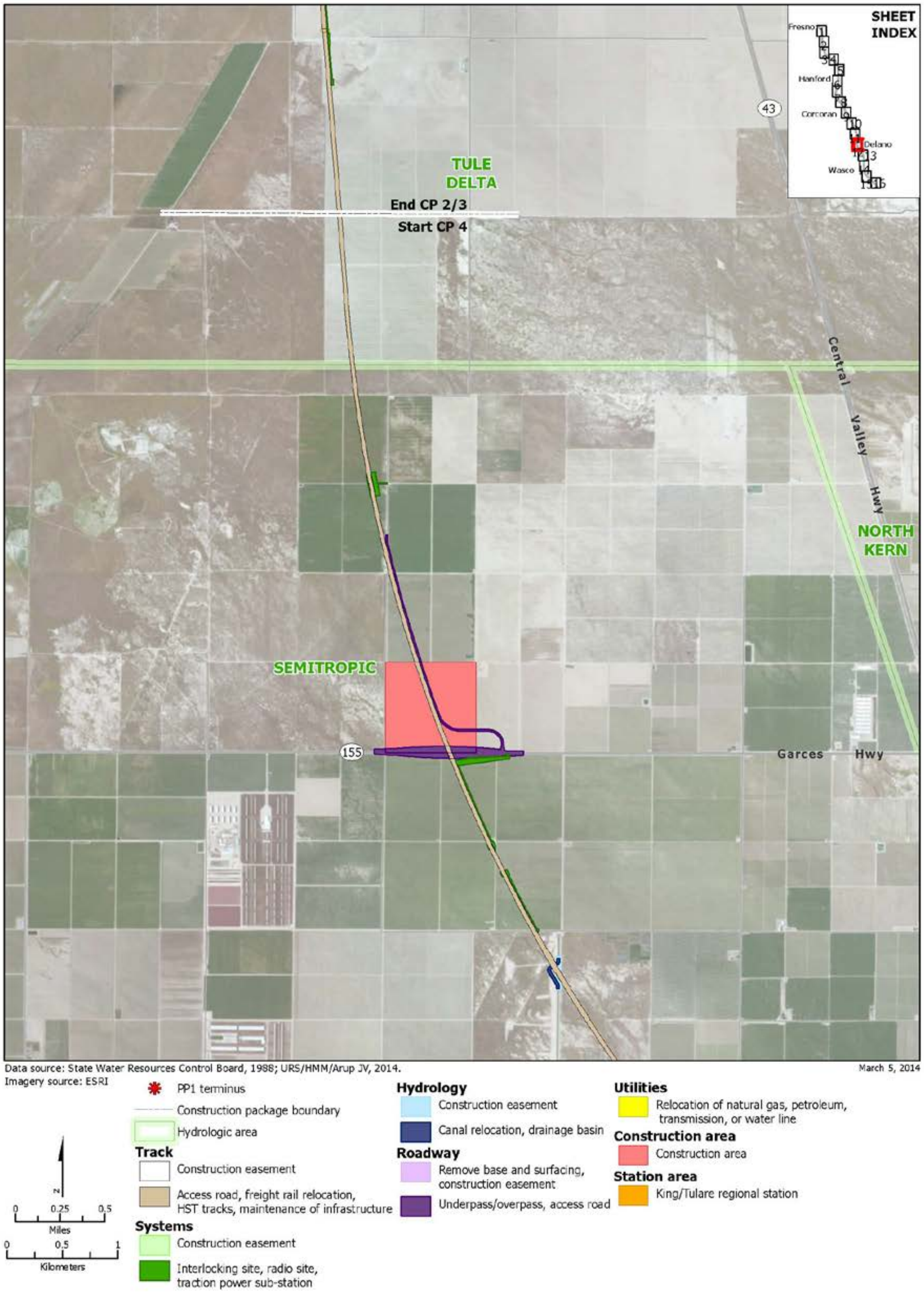


Figure 2-3
PP1 alignment construction elements
Sheet 12 of 16

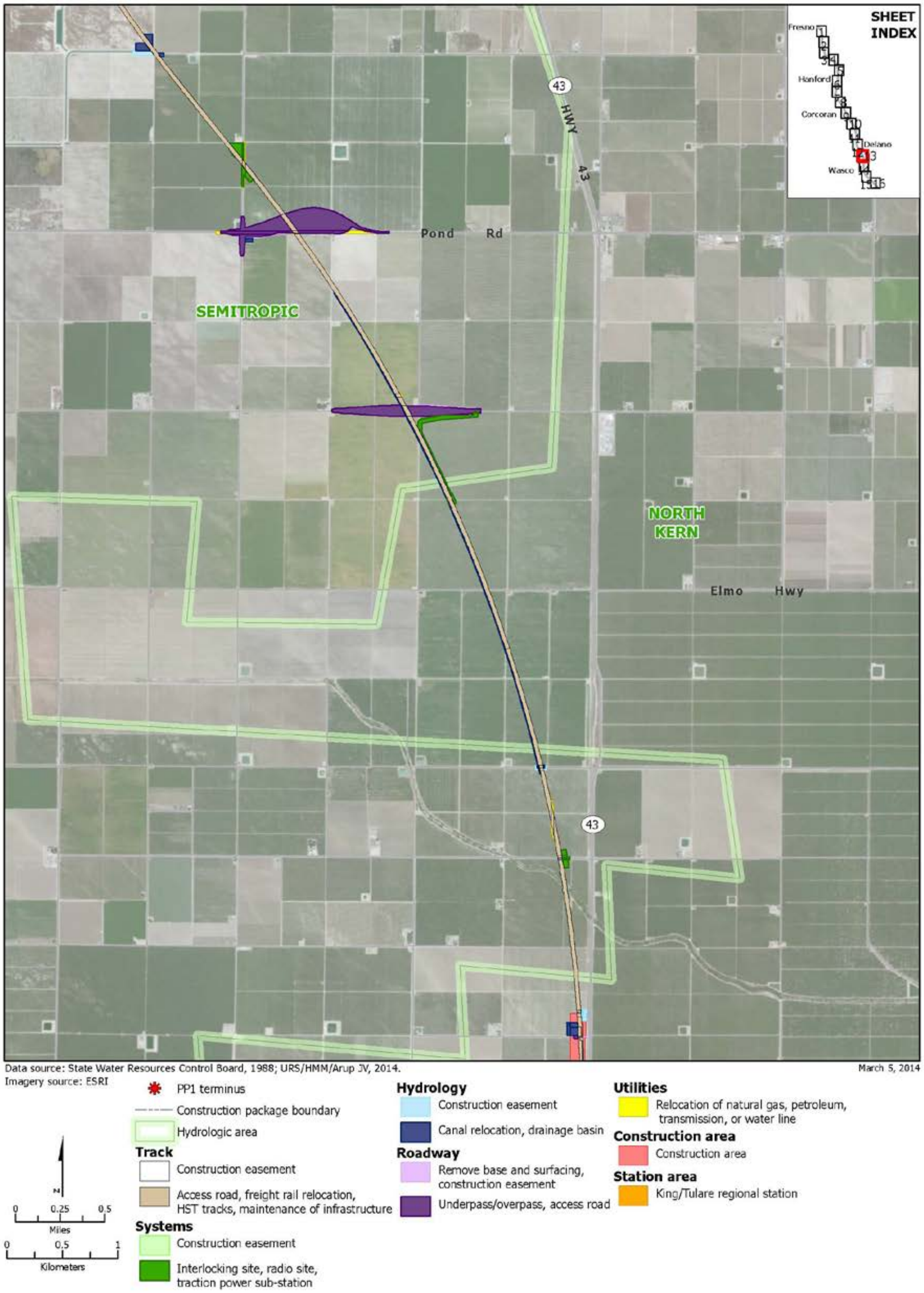


Figure 2-3
PP1 alignment construction elements
Sheet 13 of 16

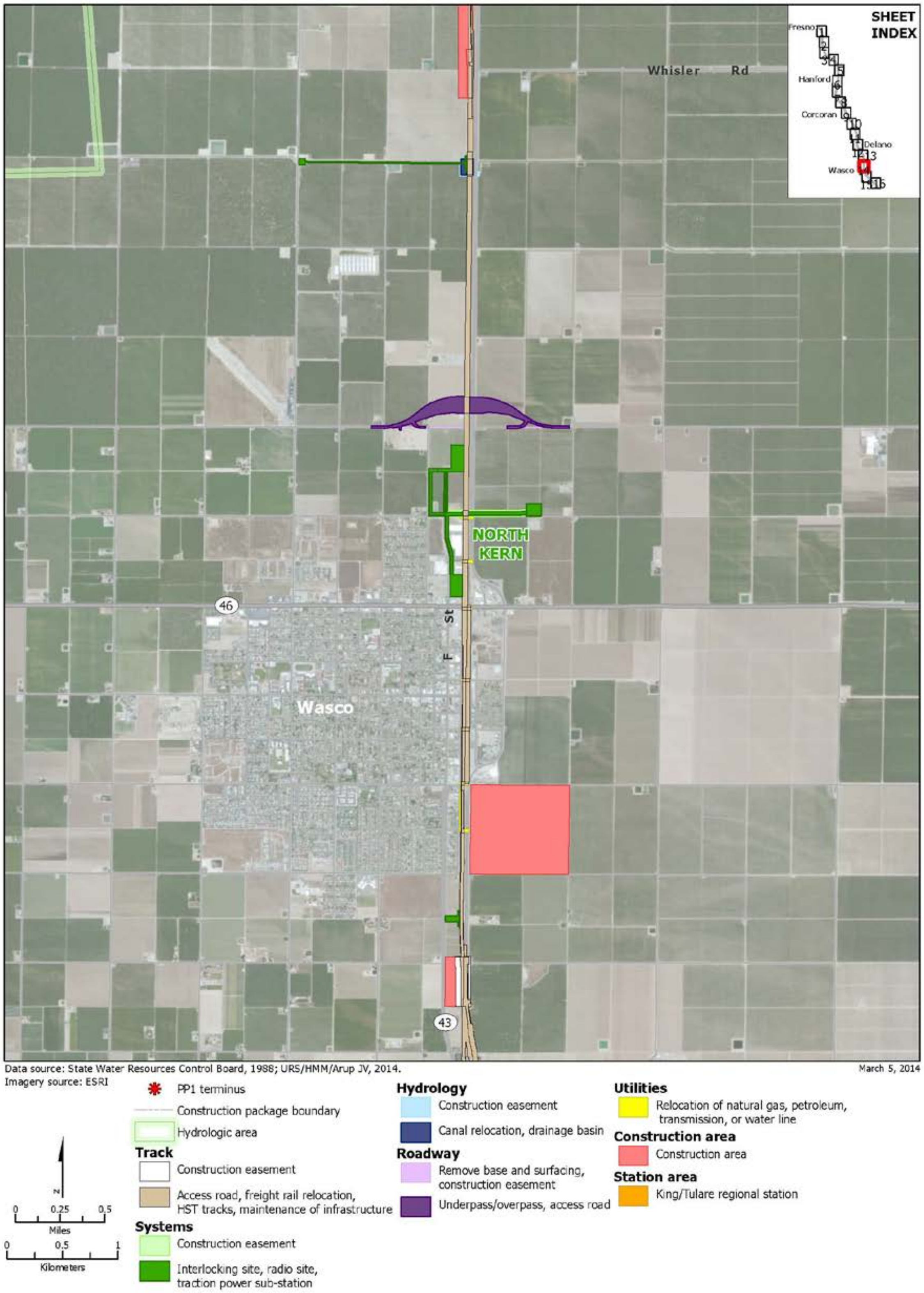


Figure 2-3
PP1 alignment construction elements
Sheet 14 of 16

RFP No.: 13-57 – Addendum No. 5 - 10/09/2014

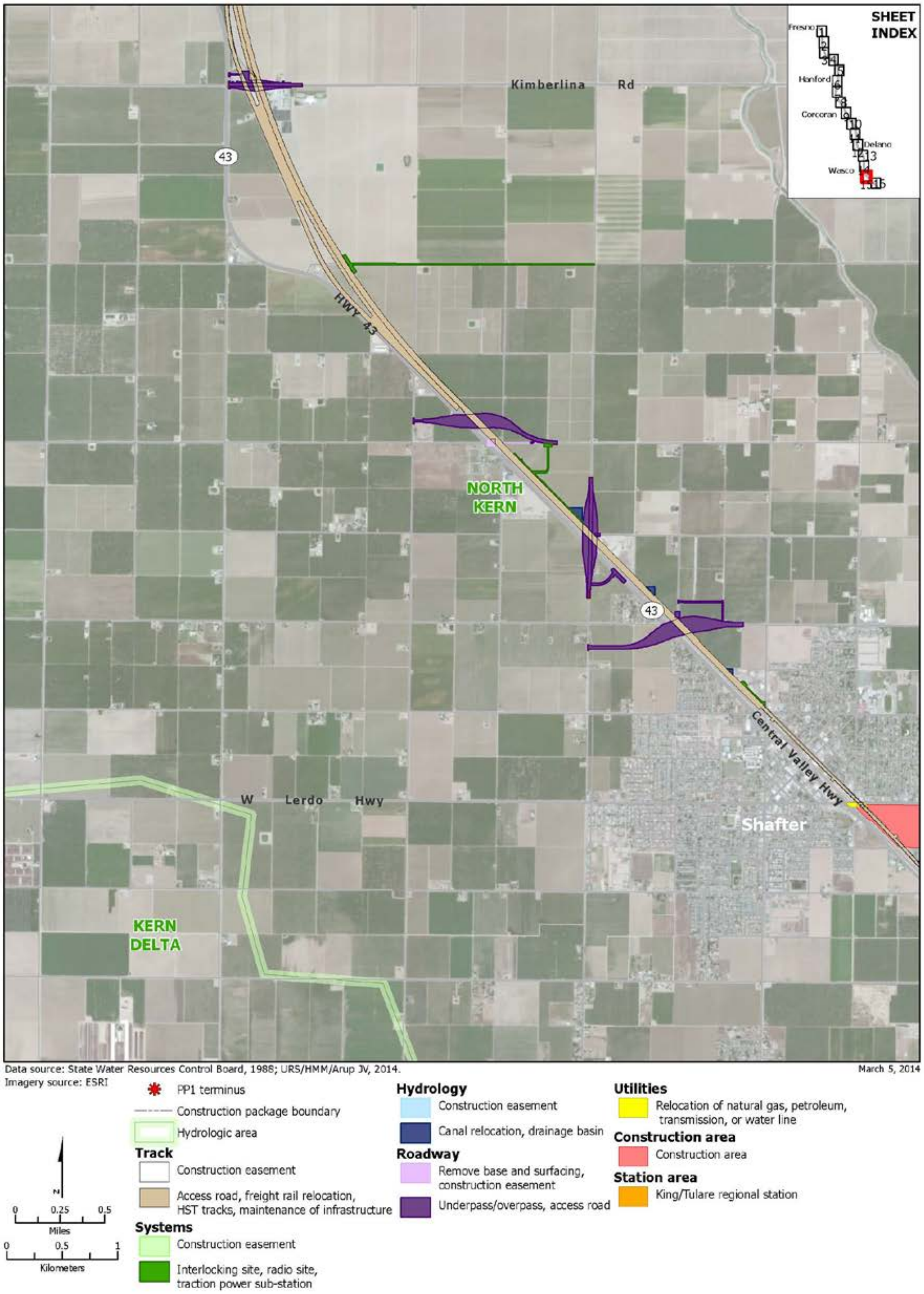


Figure 2-3
PP1 alignment construction elements
Sheet 15 of 16

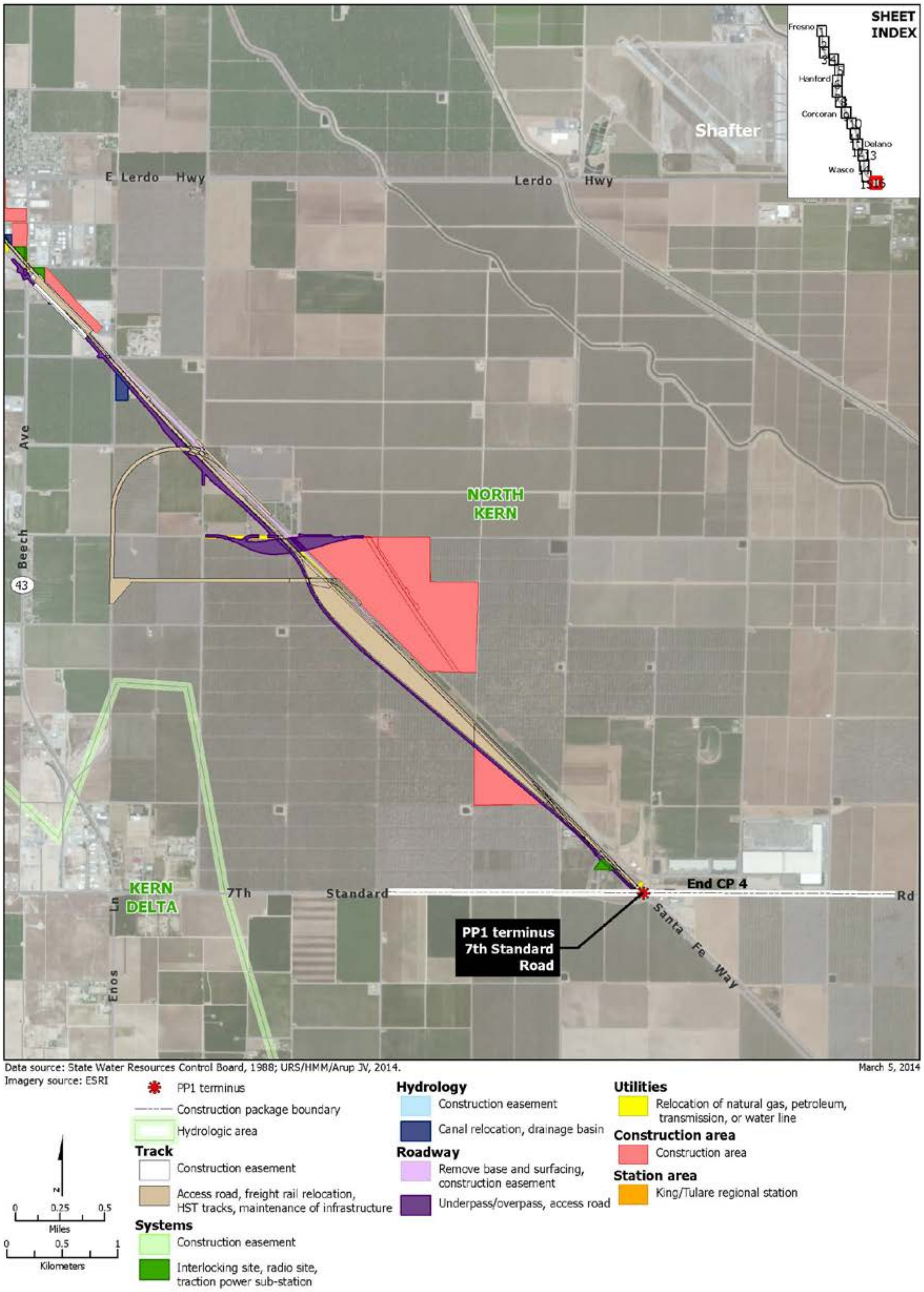


Figure 2-3
PP1 alignment construction elements
Sheet 16 of 16

RFP No.: 13-57 – Addendum No. 5 - 10/09/2014

After selecting a D/B contractor for PP1, the Authority will start right-of-way acquisition, including parcel remnants, and procure a separate construction management services contract to oversee physical construction of the project. The Authority would buy remnants portion of an acquired parcel beyond the right-of-way if a remnant is too small to sustain current use without other modifications, as shown in Figure 2-4.

Figure 2-4
Parcel Affected Beyond Project Right-of-Way

2c-3 Proposed Crossing Approach for PP1 Watercourses

The PP1 corridor crosses rivers, creeks, wetlands, vernal pools and swales, irrigation canals and ditches, and retention/detention basins. This section provides a description of the PP1 waterbody crossings and provides preliminary structural design and construction approach for the major crossings in PP1, including Kings River Complex (Cole Slough, Dutch John Cut, Old Kings River), Cross Creek, Tule River, Deer Creek, and Poso Creek. Preliminary structural design drawings provide conceptual or typical cross-sections, profiles, and plan views of typical structures at these locations that would result in fill into water features, wetlands, and other waters (see Attachment 2, Design Drawings and Typical Cross-Sections).

Water features to be crossed or filled include the following:

- Kings River Complex (Cole Slough, Dutch John Cut, Old Kings River) – elevated truss structures
- Cross Creek – elevated truss structure
- Tule River – elevated structure
- Deer Creek – elevated structure
- Poso Creek – bridge
- A remnant slough (Guernsey Slough) - culvert
- Canals and ditches (106 features) – culvert or box culvert
- Vernal pools and swales, emergent wetlands, and seasonal wetlands (58 features) – at-grade fill, culvert, or box culvert
- Retention/detention basins (54 features) – at-grade fill, culvert, or box culvert

The proposed river and creek crossings would be accomplished by constructing elevated structures or guideways to safely span the waterbody. Elevated structures or guideways that cross these rivers and creeks are anticipated to be supported by either a cast-in-drilled-hole pile or a reinforced concrete pile footing. The pre-cast span-by-span segmental method is the proposed method to build the concrete bridge spans associated with elevated sections. Prior to construction of the proposed crossings, geotechnical investigations will be conducted. Geotechnical sampling would be a temporary impact limited to 100 linear feet of the waterways within the existing construction footprint identified at the respective crossing.

The construction of the aerial structures is proposed to begin in fall 2014, with in-stream work occurring from June 1 to October 15. Construction is anticipated to take approximately four construction seasons, including two seasons of near-water or, at times, in-water work (depending on flow) and an additional two seasons for construction of upland piers and bridge decks. Staging areas for construction equipment will be located outside sensitive biological resources, including habitat for special-status species, habitats of concern (e.g., waters of the United States, waters of the State, wetlands, riparian communities), and wildlife movement corridors, to the maximum extent possible.

Culverts are needed where embankments or other elevated, linear project facilities could impede floodplain flows or cross small drainages, irrigation drains, or canals. In some cases, roads are envisioned to provide access to land parcels where current access would be blocked by project features, and these new access roads must cross existing waterbodies. Locations also occur at which the track right-of-way or portions of the construction footprint will overlap sections of natural channels and irrigation canals that parallel the project. In some cases, the overlap may be eliminated during final design by refining the alignment to avoid the waterbodies. To ensure track isolation and safety, no active irrigation canals may remain parallel to the HST within the fenced portion of the HST right-of-way.

It is anticipated that construction at some locations will occur when water features contain open or flowing water. In some cases, construction of a stream crossing may require more than one season to complete and dewatering or diversion of water from the work area may be required. Geotechnical borings for surveys would also occur in channels. Areas requiring dewatering would be isolated by temporary cofferdam systems made up of sheet piling, water-filled bladders, or other typical methods and the areas would be dewatered, as necessary, to permit construction. Diverted surface water or groundwater would be directed back into the original waterbody downstream from the cofferdam in a manner that meets Basin Plan turbidity objectives, or such water could be applied on land or other filtration medium, depending on the specific situation. BMPs for clear water diversions and construction dewatering will be implemented to avoid impacts on water quality during construction within and adjacent to streams as identified in Block 11 (Section 9) of this application. Construction dewatering and/or discharges to land would be performed in compliance with any required permits. As per biological mitigation measure #49 (BIO-MM #49) in the EIR/EIS, a biological monitor will be present during in-stream and associated riparian habitat construction activities (Authority and FRA 2014).

Access to all stream crossings will be from existing access roads onto the right-of-way. Vehicle and equipment movement to and across streams will be limited. Equipment and material will generally be confined to the right-of-way outside of actively flowing streams, with the exception of specific in-stream work. Equipment and vehicles needed to perform the work are anticipated to include utility, concrete, and water trucks; geotechnical boring equipment, graders; cranes; barges, backhoes; draglines; vibratory hammers; and assorted hand tools and equipment.

Specific details for larger project crossings at the Kings River complex, Cross Creek, Tule River, Deer Creek, and Poso Creek are provided below. Typical design drawings of plan view, crossing profiles, and cross sections for these locations are provided in Attachment 2, Design Drawings and Typical Cross-Sections. A general discussion of construction design pertaining to canals and ditches, depressional aquatic features, and retention/detention basins follows. Detailed design drawings showing cross section and plan view for all of the smaller crossings have not been developed to date.

The Preliminary Jurisdictional Waters and Wetlands Delineation Report constitutes a delineation submitted to the USACE for purposes of obtaining a Preliminary Jurisdictional Determination under USACE Regulatory Guidance Letter 08-02. The USACE has also received a Section 404 Individual Permit Application for PP1. Additional information regarding riparian area can also be found in the CDFW Section 1602 Standard Streambed Alteration Agreement Notification Application for PP1 which is scheduled to be submitted in March 2014.

2c-3.1 Kings River Complex Crossing

The Kings River is in three separate branches at the crossing (Dutch John Cut, Cole Slough and Old Kings River)[1]. The preliminary design of the Kings River Crossings includes an 11,700-foot-long elevated structure which will span all three branches of the Kings River complex. The foundation of the elevated structure would consist of 10-foot-diameter columns that are generally spaced 100 to 121.5 feet on center. Four segments of the elevated structure are truss bridges. One truss bridge crosses over Cole Slough with a 357-foot-long single span. The second truss bridge crosses over Dutch John Cut with two spans of 357 feet each and a two-column pier

[1] The Kings River moved from its original alignment during large storm events in 1861 and 1867. The main flow channel moved from its original alignment (Old Kings River) into Cole Slough, several miles upstream of the HST crossing. At the HST crossing location, the river returns to its original alignment through Dutch John Cut, which connects Cole Slough to the Kings River. At the crossing, Dutch John Cut conveys the main flow of the Kings River.

located in the overbank area on the northern side of the main channel. The third truss bridge crosses over Old Kings River immediately downstream of an existing earthen low-flow crossing, with two spans of 322 feet each and a two-column pier located in the main channel. The fourth truss bridge is a single-span bridge of 318.5 feet long that crosses over Riverside Ditch.

The track would be elevated approximately 800 feet north of Cole Slough to provide ample clearance for flood flows and wildlife. The elevated structure will have a minimum elevation of 18 feet above the federal flood control levees at the Kings River complex. It is anticipated that a single pile will be placed in the center of Old Kings River with an additional pile placed in the center of Dutch John Cut. No piles are anticipated to be placed within Cole Slough (see Figures 2-5 to 2-7).

2c-3.2 Cross Creek Crossing

The proposed approach for the Cross Creek Crossing would be similar to that proposed for the Kings River Crossings. The HST alignment will transverse Cross Creek with a 9,600-foot long elevated structure. The main channel would be crossed in a single span with a 325-foot truss bridge with support structures located on the banks of the creek. The elevated structure soffit is approximately 15.5 feet over the top of the banks. The elevated approach begins approximately 4,000 feet north of the northern bank of Cross Creek, and it has a minimum vertical clearance of about 30 feet. A steel truss structure would span the main channel. See Figure 2-8 for a detailed drawing of the crossing.

2c-3.3 Tule River Crossing

The proposed approach for the Tule River Crossing will be similar to that proposed for the Kings River Crossings. The elevated approach begins approximately 8,000 feet north of the Tule River and has a minimum vertical clearance over the river of about 30 feet. See Figure 2-9 for a detailed drawing of the crossing. A single pile is anticipated to be placed in the Tule River towards the southern bank.

2c-3.4 Deer Creek Crossing

The proposed approach for the Deer Creek Crossing will be similar to that proposed for the Kings River Crossings. The elevated approach begins approximately 200 feet north of the creek and has a minimum vertical clearance over the river of approximately 6 feet. See Figure 2-10 for a detailed drawing of the crossing. A single pile is anticipated to be placed within Deer Creek near the northern bank.

2C-3.5 Poso Creek Crossing

Poso Creek would be crossed by bridge. A bridge abutment would be built approximately 40 feet from the northern bank of Poso Creek and bridge span would have a minimum vertical clearance over the creek of approximately 10 feet. See Figure 2-11 for a detailed drawing of the crossing. A single pile is anticipated to be placed in the middle of the creek..

2C-3.6 Canals and Ditches

A total of 106 canals and ditches will be crossed and temporarily and permanently impacted. Crossings will be accomplished using bridges, precast concrete culverts, or box culverts with the size of the opening being dependent on the hydrology. Some culverts may be cast in place as determined appropriate by the construction contractor. Culverts will be sized to pass maximum canal/drain flows at all crossing locations.

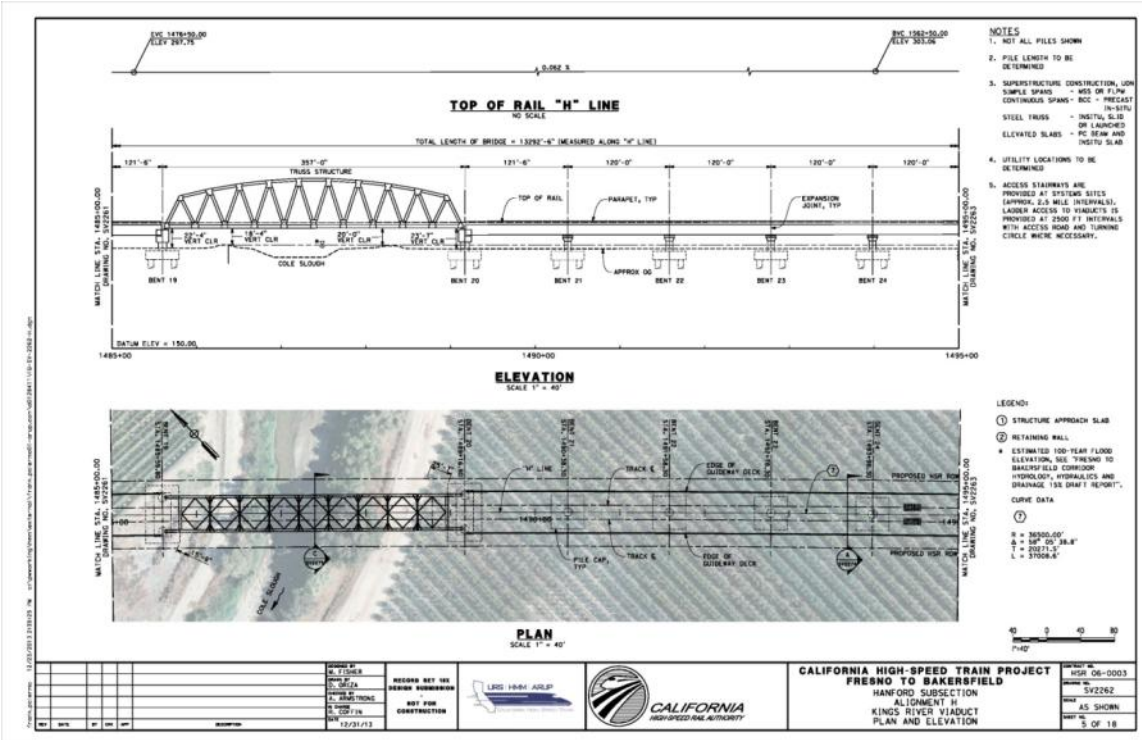


Figure 2-5
Cole Slough Crossing

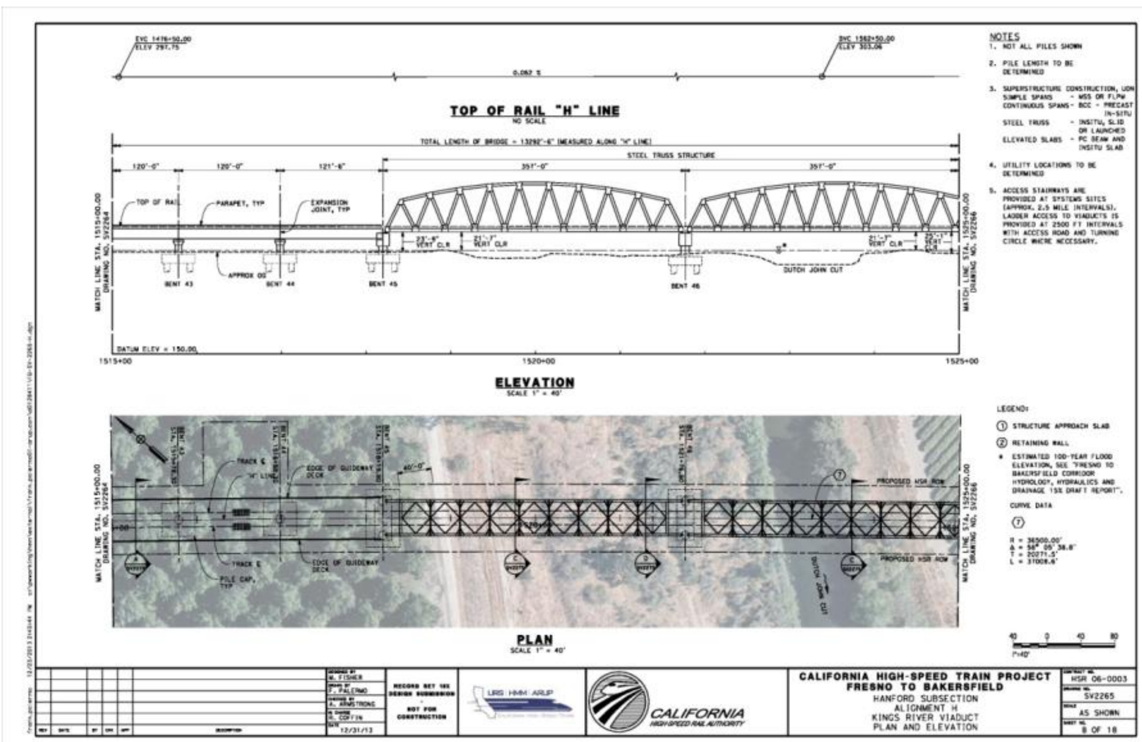
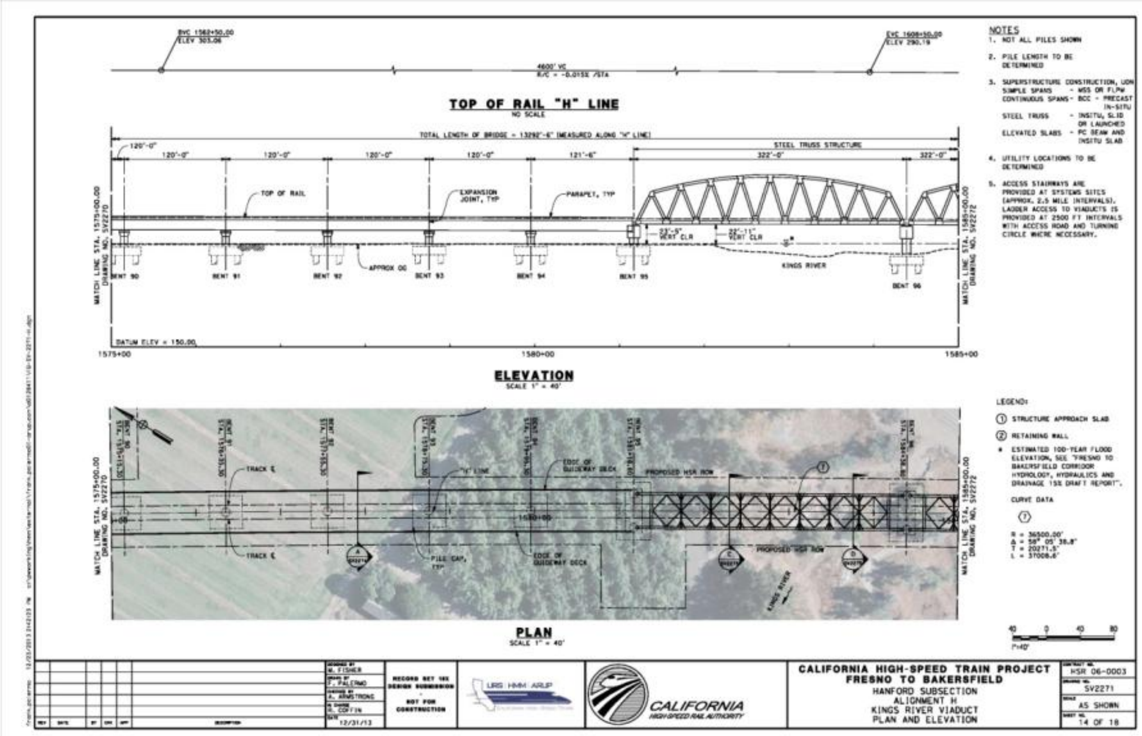


Figure 2-6
Dutch John Cut Crossing



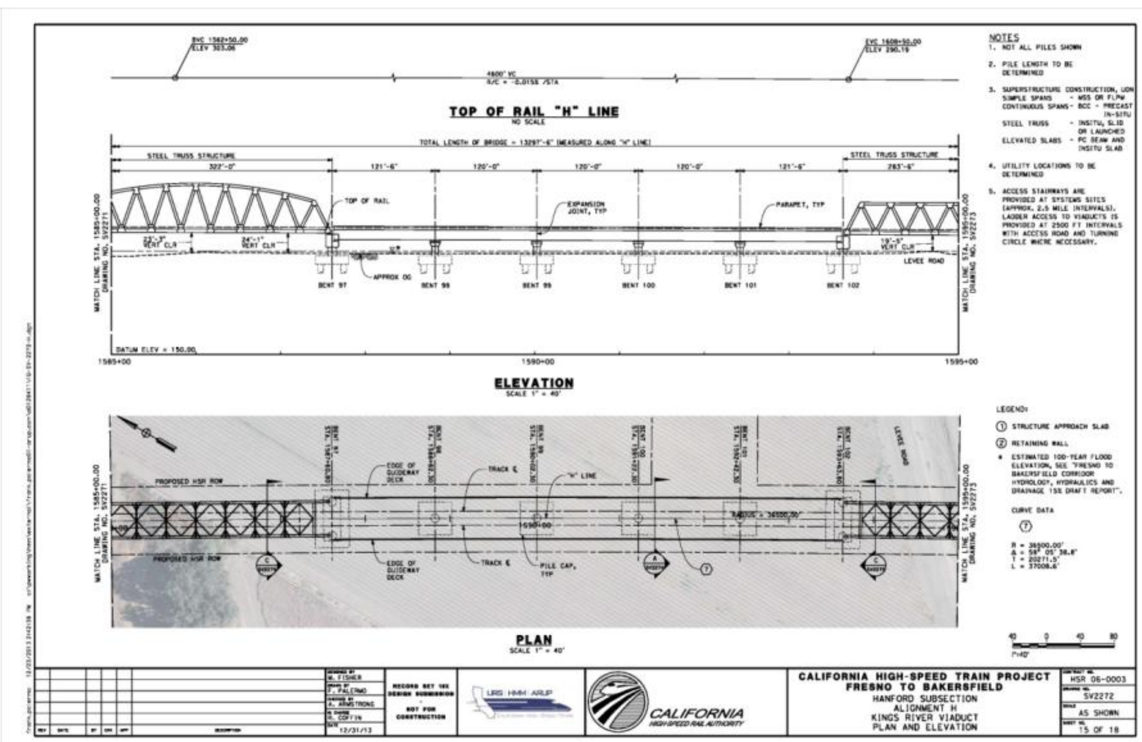
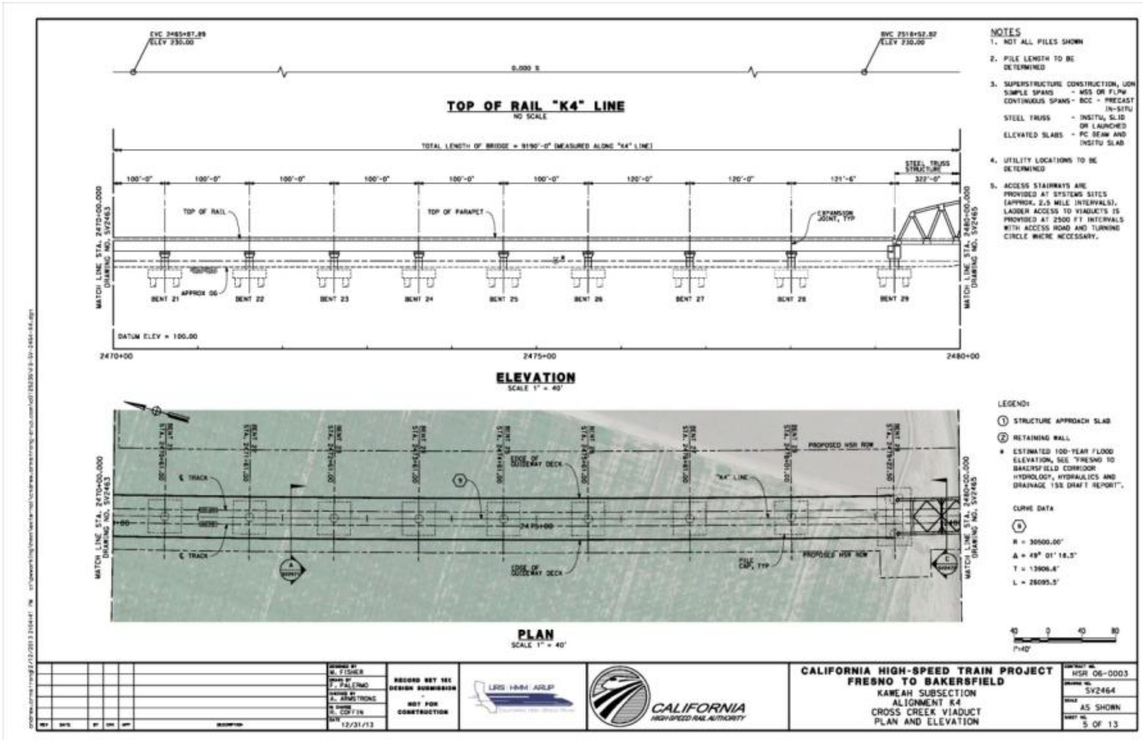


Figure 2-7
Old Kings River Crossing

RFP No.: 13-57 – Addendum No. 5 - 10/09/2014



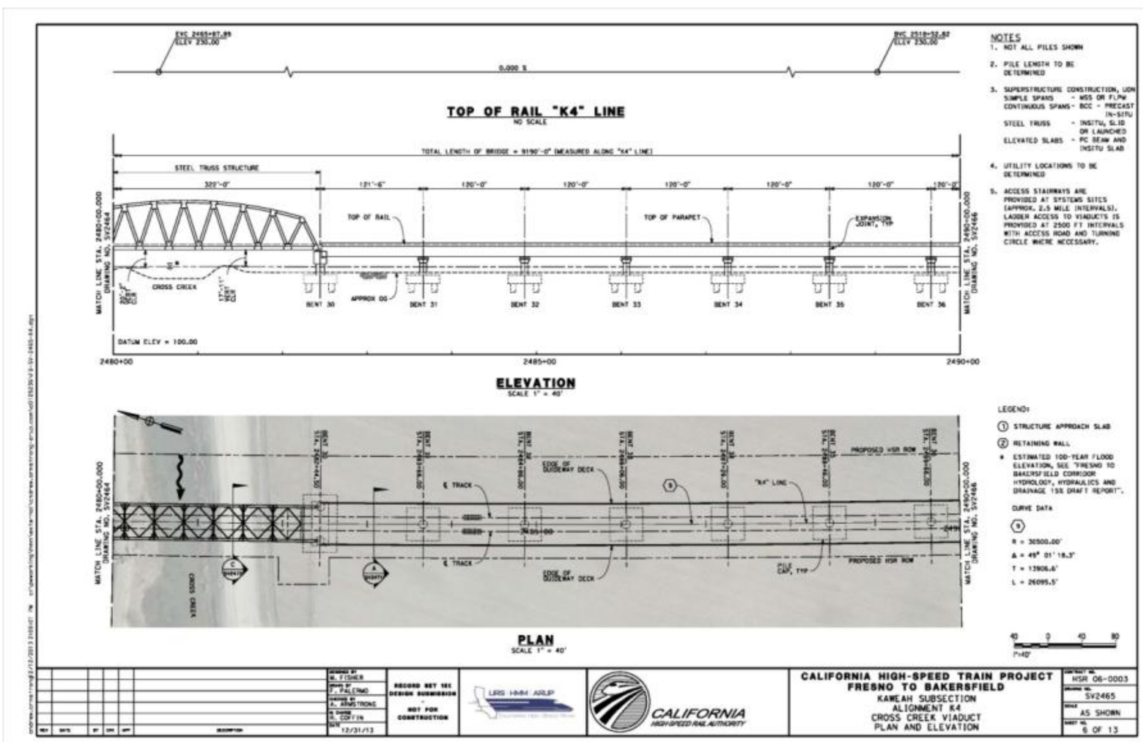


Figure 2-8
Cross Creek Crossing

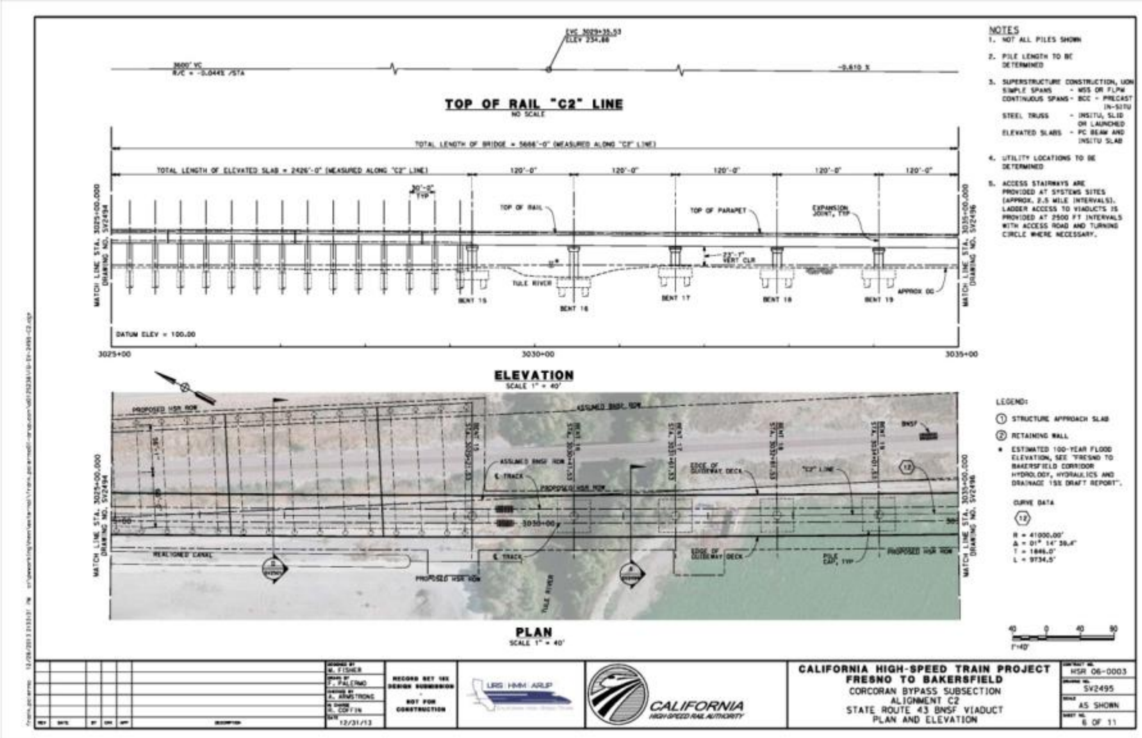


Figure 2-9
Tule River Crossing

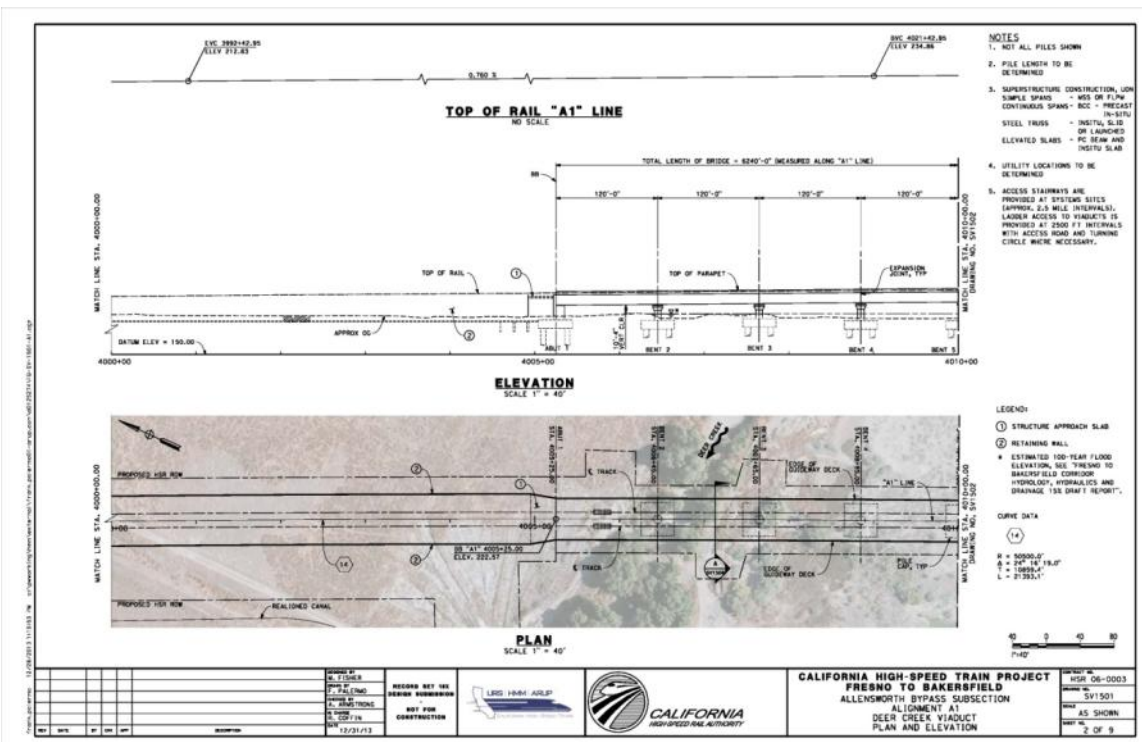


Figure 2-10
Deer Creek Crossing

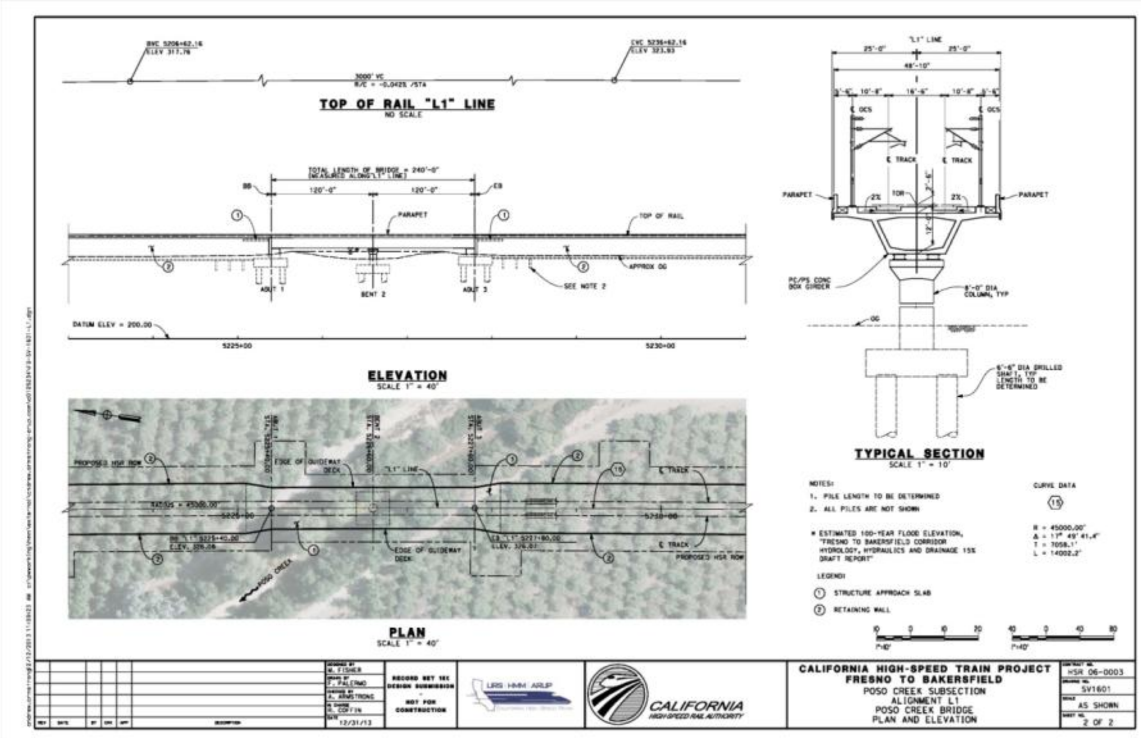


Figure 2-11
Poso Creek Crossing

2C-3.7 Depressional Aquatic Features (Wetlands, Vernal Pools and Swales)

Vernal pools and swales, emergent wetlands, and seasonal wetlands (58 total features) will be temporarily and permanently impacted, with fill placed across the features as necessary to support the HST guideway, other than in areas associated with elevated track (e.g., approach to crossing of highway or major stream feature). Fill across depressional features will be limited to that portion required to support the trackway and culverts installed, where necessary.

2C-3.8 Retention/Detention Basins

The approach for crossings of retention/detention basins (54 total features) will be similar in nature to the approach used to cross depressional aquatic features. Temporary and permanent impacts will occur due to fill which will be placed in basins as necessary to support the guideway and will be limited to the amount required. Culverts will be installed where necessary. Depending on the extent of the impact, basins would be modified, improved, or replaced as needed onsite to maintain existing drainage and hydrologic functions, and to support HST drainage requirements.

Block 2d: Proposed Construction Schedule

Construction would commence in fall 2014, with initial portions of the project anticipated to complete construction as early as 2017. The Fresno to Bakersfield Section, including PP1, will be built using a D/B approach. Construction activities may occur at multiple points along PP1, depending on negotiations with property owners, agreements with utility owners, and status of environmental clearances. During construction, work window restrictions will be implemented during which certain activities such as initial site preparation will be phased to minimize effects on resources. This includes construction in waters of the United States, waters of the State to occur outside the rainy season to the extent feasible. As part of the D/B procurement and award,

the contractors will propose a construction schedule that will additionally outline how the sequencing of construction will occur.

During peak construction periods, work is envisioned to be under way at several locations along the route, with overlapping construction of various project elements. Working hours and workers present at any time would vary depending on the activities being performed. The overall schedule for construction is provided in Table 2-2.

Table 2-2
Approximate Construction Schedule[a,b]

Activity	Tasks	Duration
Geotechnical Survey Boring	Mobilize special geotechnical boring equipment and drill borings	To be determined
Right-of-way Acquisition	Proceed with right-of-way acquisitions once State Legislature appropriates funds in annual budget	March 2013–March 2015
Survey and Preconstruction	Locate utilities, establish right-of-way and project control points and centerlines, establish or relocate survey monuments	March 2013–October 2013
Mobilization	Safety devices and special construction equipment mobilization	April 2014–July 2014
Site Preparation	Utilities relocation; clearing/grubbing right-of-way; establishment of detours and haul routes; preparation of construction equipment yards, stockpile materials, and precast concrete segment casting yard	July 2014–November 2014 (two site preparation periods)
Earth Moving	Excavation and earth support structures	November 2014–November 2016
Construction of Road Crossings	Surface street modifications, grade separations	November 2014–November 2016
Construction of Aerial Structures	Aerial structure and bridge foundations, substructure, and superstructure	November 2014–January 2017
Track Laying	Includes backfilling operations and drainage facilities	November 2016–July 2017
Systems	Train control systems, overhead contact system, communication system, signaling equipment	November 2016–May 2019
Demobilization	Includes site cleanup	October 2016–April 2017 (two demobilization periods)
Maintenance-of-Way Facility	Potentially collocated with HMF[a,c]	May 2017–November 2018
HST Stations	Demolition, site preparation, foundations, structural frame, electrical and mechanical systems, finishes	Fresno: June 2017–April 2020 Kings/Tulare Regional: June 2020–June 2023[d] Bakersfield: June 2018–April 2021

Notes:
[a] Presumes a two-phase implementation of the project: first construction will meet the ARRA funding deadline and be completed in 2017; the remainder of the Initial Operating Segment will be completed by 2022 per the Business Plan and based on anticipated funding flow.
[b] Final design will be completed by the design-build contractor following contract award and issuance of the Notice to Proceed for each construction package.
[c] HMF would be sited in either the San Jose to Merced, Merced to Fresno, or Fresno to Bakersfield Section.
[d] Right-of-way would be acquired for the Kings/Tulare Regional Station; however, the station itself would not be part of initial construction.

RFP No.: 13-57 – Addendum No. 5 - 10/09/2014

Section 3:

Federal Licenses / Permits and Other Licenses, Permits, and Agreements

Section 3 Blocks 3 and 4: Federal Licenses/Permits and Other Licenses, Permits and Agreements

All required permits and other authorizations are listed below. The applications that have been submitted to the respective agencies are included on the enclosed CD-ROM. The remaining permits and authorizations that are in progress will be provided to the SWRCB upon their completion.

Block 3: Federal Licenses/Permits

- USACE Section 404 Individual Permit Application, Permitting Phase 1, USACE File No. SPK-2009-01482. (The 404 application was submitted to USACE in January 2014).
- River and Harbors Act Section 10 Permit for Construction of any Structure in or over any Navigable Water of the United States (TBD).
- USACE Section 408 Determination (TBD).

Block 4: Other Licenses/Permits/Agreements

- CDFW Incidental Take Permit pursuant to Section 2081 of the California Fish and Game Code. A draft application was submitted to CDFW in August 2012 and comments were received. A final 2081 application will be submitted to CDFW in March 2014 and a permit issued by CDFW is anticipated by October 2014.
- CDFW Master Streambed Alteration Agreement for PP1 pursuant to Section 1602 of the California Fish and Game Code. An application for a master agreement will be submitted to CDFW in March 2014. The D/B contractor will perform sub-notifications.
- Caltrans Encroachment Permits. These permits will be obtained by the D/B contractor during design/construction of the HST project.
- Regional Water Quality Control Board Section 402 NPDES Water Discharge Individual Permit for Operational Discharges (TBD).
- Central Valley Regional Water Quality Control Board, Order No. R5-2013-0074, Waste Discharge Requirements for Dewatering and Other Low Threat Discharges to Surface Waters. This permit will be obtained by the D/B contractor during design/construction of the HST project.
- SWRCB NPDES General Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activities (Order No. 2009-0009-DWQ; as amended by 2010-0014-DWQ and 2012-0006-DWQ; NPDES No. CAS000002). This permit will be obtained by the D/B contractor during design/construction of the HST project.
- Central Valley Flood Protection Board Section 208 (flood protection facilities). These permits will be obtained by the D/B contractor during design/construction of the HST project.

4a-1 Historic Properties and Cultural Resources

The available information indicates that potentially eligible cultural resources may be affected by the project. The lead federal agency, FRA, has initiated consultation with the State Historic Preservation Officer (SHPO) under Section 106 of the National Historic Preservation Act (NHPA)

and will continue consultation, as appropriate (Authority and FRA 2011a). FRA has also initiated consultation with federally recognized Native American tribes with traditional ties to the region.

Cultural resources investigations have been undertaken for both above- and below-ground resources in accordance with NHPA Section 106, CEQA, SHPO standards and guidelines, and the approved Programmatic Agreement for the California HST project. Draft technical reports and associated supplements have been prepared to document cultural resources on this project, including:

- Fresno to Bakersfield Archaeological Survey Report (Authority and FRA 2011b) and Fresno to Bakersfield Supplemental Archaeological Survey Report (Authority and FRA 2012a).
- Fresno to Bakersfield Historic Architectural Survey Report (Authority and FRA 2011c), Fresno to Bakersfield Supplemental Historic Architectural Survey Report (Authority and FRA 2012b), and Fresno to Bakersfield Second Supplemental Historic Architectural Survey Report (Authority and FRA 2013c).
- Fresno to Bakersfield Historic Property Survey Report (Authority and FRA 2011d), Fresno to Bakersfield Supplemental Historic Property Survey Report (Authority and FRA 2012c), and Fresno to Bakersfield Second Supplemental Historic Property Survey Report (Authority and FRA 2013d).

Significant cultural resources, both architectural and archaeological, are presented in detail in the Historic Property Survey Report (Authority and FRA 2011d). Historic architectural resources determined not eligible and outside any impact areas are presented in the Historic Architectural Survey Report (Authority and FRA 2011c). Archaeological resources recommended as not eligible are presented in the Archaeological Survey Report (Authority and FRA 2011b).

Extensive background research was undertaken from a variety of sources, including local historical societies, libraries, municipal offices, the CHRIS data centers, Caltrans repositories, through Native American consultation, and a wide variety of online materials, to identify all previously documented above- and below-ground cultural resources. Additionally, field studies were undertaken during 2010 for this project. For archaeological resources, all parcels of land where access could be legally obtained, along all alternatives, were field walked by qualified archaeologists. All above-ground resources built prior to 1961 were visited and documented in the field, where access was either approved, or the resource was visible from public roads/sidewalks.

A Findings of Effect report is currently being completed for the Preferred Alternative, and addendum studies are currently being undertaken.

Endangered Species Act Compliance

Consultations with USFWS and NMFS, pursuant to Section 7 of the federal Endangered Species Act (ESA), were completed with the issuance of a Biological Opinion (BO) for the Fresno to Bakersfield Section by USFWS in February 2013 and a No Effect Determination Letter submitted to NOAA Fisheries in June 2011. The FRA has re-initiated consultation to cover effects associated with the Fagundes Compensatory Mitigation Site; an amended BO from USFWS is expected to be received in spring 2014. See Section 8, Block 10 for information on Threatened and Endangered Species.

Section 4
California Environmental Quality Act

Section 4 Block 5: California Environmental Quality Act

Lead Agency

For the California HST System, including the Fresno to Bakersfield Section, the Authority is the lead state agency for compliance with CEQA and other state laws.

Notice of Preparation

After completion of the Program Environmental Impact Report/Environmental Impact Statement (EIR/EIS) documents (Authority and FRA 2005, 2008), the Authority, in cooperation with the FRA, began the environmental review process for the Fresno to Bakersfield Section of the California HST project. A Notice of Preparation was published February 24, 2009.

CEQA Document

The Authority and FRA have prepared program-wide and project-wide environmental documents for the HST System under CEQA and National Environmental Policy Act (NEPA). The Fresno to Bakersfield Section EIR/EIS was developed in consultation with resource and regulatory agencies, including EPA and USACE. The Authority and FRA circulated the Draft EIR/EIS for the Fresno to Bakersfield Section to affected local jurisdictions, state and federal agencies, tribes, community organizations, other interest groups, and interested individuals for 60 days from August 15 to October 13, 2011. In response to stakeholder, agency, and public feedback on the HST alignment alternatives, the Authority and FRA decided in fall 2011 that it would revise the Draft EIR/EIS to include additional route and station options. The Revised Draft EIR/Supplemental Draft EIS included new alignment alternatives and station locations west of Hanford, an additional alternative through Bakersfield, and refinements to the existing Fresno to Bakersfield alternative alignments. The Authority and FRA circulated the Revised Draft EIR/Supplemental Draft EIS for the Fresno to Bakersfield Section to affected local jurisdictions, state and federal agencies, tribes, community organizations, other interest groups, and interested individuals for 60 days from July 20 to September 20, 2012, then extended the comment period for an additional 30 days to October 19, 2012. The Final EIR/EIS is expected to be submitted in February 2014.

Formal letters from the USACE and EPA dated December 19, 2013 concurred with the Authority and FRA’s selection of the Preferred Alternative as the preliminary least environmentally damaging practicable alternative from Fresno station to 7th Standard Road. A description of the Preferred Alternative can be found in Attachment 1, Project Description.

CEQA documents can be obtained at the following url:
http://www.hsr.ca.gov/Programs/Environmental_Planning/revised_draft_fresno_bakersfield.html

Notice of Determination or Expected Date of Completion

A Notice of Determination for the Fresno to Bakersfield Section of the HST project is expected in spring 2014.

This page intentionally left blank

Section 5
Project Site Description - General

Section 5 Block 7: Project Site Description – General

Block 7a: Project Location

PP1 of the Fresno to Bakersfield Section of the California HST project extends approximately 100 miles from the City of Fresno (Fresno County) through portions of Fresno, Kings, Tulare, and Kern counties. For most of this length, the alignment lies adjacent to either the existing BNSF railway or SR 43.The northern extent of PP1 is in the City of Fresno south of SR 41 adjacent to Monterey Street (Fresno County; Latitude 36°43'25.66"N, Longitude 119°47'3.50"W) and terminates at the intersection of 7th Standard Road and SR 43 in the unincorporated community of Crome (Kern County; Latitude 35°44’16.35"N, Longitude 119°19’88.06"W).

See Section 2, Block 2: Project Description, for project location maps.

Block 7c: Site Description of the Entire Project Area

As described above, PP1 is approximately 100 miles long, and its footprint covers a total of approximately 9.2 square miles (or almost 5,900 acres). The municipalities in or near the PP1 footprint are the cities of Fresno, Hanford, Corcoran, Wasco, and Shafter. The unincorporated communities in or near the footprint are Oleander and Conejo in Fresno County, Ponderosa in Kings County, Allensworth in Tulare County, and Crome in Kern County.

PP1’s northern terminus is in the Fresno South U.S. Geological Survey 7.5 minute topographic quadrangle (topo quad), and its southern terminus is in the Rosedale topo quad. Between these two points, PP1 would pass through the following topographic quadrangles: Allensworth, Alpaugh, Burris Park, Caruthers, Conejo, Corcoran, Laton, Malaga, Pond, Remnoy, Rio Bravo, Rosedale, Taylor Weir, Wasco, Wasco Northwest, and Waukena.

Topography in this area is generally flat with slopes ranging from 0 to 2 percent at elevations ranging from 160 to 300 feet above mean sea level. Land use in the vicinity of PP1 is primarily rural residential and agricultural with population concentrations near Fresno and Bakersfield. Much of the nonresidential landscape is managed through row agriculture and irrigation networks.

While historically, the Central Valley was characterized by California prairie, marshlands, valley oak savanna, and extensive riparian woodlands, today land is predominantly used for farms and ranches. Urban areas along PP1 include the communities of Fresno and Bakersfield. Natural and semi-natural vegetation communities are uncommon and are limited to uncultivated areas supporting California annual grassland, narrow bands of riparian habitat along seasonal riverine features, and wetland communities located on floodplain terraces or adjacent to seasonal riverine features. Prevalent vegetation communities include agricultural, developed land, natural and semi-natural habitats, and wetland and water resources (see the Preliminary Jurisdictional Waters and Wetlands Delineation Report).

Listed species present or potentially present in PP1 include San Joaquin kit fox, Tipton kangaroo rat, the central California tiger salamander, Blunt-nosed leopard lizard, vernal pool fairy shrimp, vernal pool tadpole shrimp, valley elderberry longhorn beetle, California jewel flower, Hoover's spurge, Kern mallow, and San Joaquin woolly threads (see USFWS BO provided with Other Requisite Material on the CD-ROM that accompanies this 401 application package).

The PP1 project lies in the Tulare Lake Basin which has a drainage area of 17,400 square miles (Central Valley RWQCB 2004). The Tulare Lake Basin is drained by the ephemeral Kings, Kaweah, Tule, and Kern Rivers, which flow to the dry beds of Tulare, Buena Vista, and Kern Lakes. Before agricultural development, the Tulare Lake Basin was dominated by four large, shallow, and

mainly temporary inland lakes. The Tulare Lakebed, which was the most northerly lake of the four, has been turned into a system of approximately 103 miles of levees and irrigation canals to direct flooding away from farmed tracts of land (USACE 1996). Because of the extensive agriculture diversions, Tulare Lake has been primarily dry since the end of the 19th century — except for a few rare, major flood events whereby the lake temporarily impounds runoff from these watersheds, sometimes with sufficient volume to discharge excess surface water northward into the San Joaquin River (DWR 2009).

The Tulare Lake Basin comprises a portion of RWQCB Region 5, including all of Kings and Tulare Counties and portions of Fresno and Kern Counties. The Fresno to Bakersfield Section is within the South Valley Floor watershed (see Figure 2-1). The South Valley Floor hydrologic units (HU) crossed by PP1 of the Fresno to Bakersfield Section have been defined and numbered by the RWQCB: 51 and 58.

South Valley Floor HU 51 includes approximately 1,848,000 acres throughout Fresno, Kings, and Tulare Counties. HU 51 is bounded by the San Joaquin River Hydrologic Basin to the north, HU 52 (Kings River HU) and 53 (Kaweah River HU) to the east, HU 58 to the south, and HU 59 (Coast Range HU) to the west. HU 51 includes the City of Fresno. Nine hydrologic areas make up HU 51, of which four are crossed by the PP1 alignment including Fresno (551.30), Consolidated (551.70), Raisin (551.20), and Hanford-Lemoore (551.90). The San Joaquin and Kings Rivers are the two principal rivers within or bordering the watershed. Fresno Slough and James Bypass on the western side of the watershed connect Kings River with the San Joaquin River during flood flows. The San Joaquin River has continuous flow, while Kings River, Fresno Slough, and James Bypass are intermittent. Major engineered features include the California Aqueduct.

South Valley Floor HU 58 includes 2,569,000 acres throughout Fresno, Kings, Tulare, and Kern Counties. HU 58 is bounded by HU 51 and HU 59 to the north, HU 53 and HU 55 (Southern Sierra HU) to the east, HU 57 to the south, and RWQCB Region 3 to the west. HU 57 encompasses nine hydrologic areas. Five are crossed by the PP1 alignment including: Kaweah Delta (558.10), Tule Delta (558.20), Lake Sump (558.30), Semitropic (558.70), and North Kern (558.80). Major rivers and streams in watershed HU 58 include the Kaweah, Tule, St. Johns, and Kern Rivers, and Cross and Poso Creeks. The west-flowing Tule River, Deer Creek, and the White River are also major drainages in the watershed, which discharge into the Tulare Lakebed. Deer Creek, Poso Creek, and the Kaweah River, St. Johns River, Kern River, Tule River, and White River are ephemeral, intermittent, or perennial. Major engineered features include the Friant Kern Canal and the California Aqueduct.

Seasonal riverine features that cross the PP1 corridor include Cole Slough (intermittent), Dutch John Cut (intermittent), Kings River (perennial) , Cross Creek (intermittent), Tule River (intermittent), Deer Creek (intermittent), and Poso Creek(intermittent). The project also crosses a remnant slough (a branch of Guernsey Slough). It has been determined that none of these seasonal riverine features potentially support special-status fish species (No Effect Determination, NMFS 2013). Numerous irrigation canals and drainages also lie within the PP1 corridor. In addition, vernal pools, vernal swales, emergent wetlands and seasonal wetlands are also present. Section 3.8.4 of the EIR/EIS (Authority and FRA 2014) provides a site description of the entire project area; Figure 3.8-1 in the EIR/EIS presents the regional hydrology. The EIR/EIS is provided with this 401 application on CD-ROM under Other Requisite Material.

Water quality in the PP1 project area is regulated by the SWRCB and the Central Valley RWQCB. The Basin Plan (Central Valley RWQCB 2004) designates beneficial uses for specific surface water and groundwater resources, establishes water quality objectives to protect those uses, and sets forth policies to guide the implementation of programs to attain the objectives. Table 7-1 lists the beneficial uses that have been identified for water bodies in the Tulare Lake Basin that are

crossed by the Fresno to Bakersfield Section of the HST (Central Valley RWQCB 2004). Beneficial uses for canals are not identified in the Basin Plan.

Table 7-1
Beneficial Uses of Surface Water in the Project Vicinity

Surface Water Body	Beneficial Uses
Kings River (Peoples Weir to Stinson Weir on North Fork and to Empire Weir No. 2 on South Fork)	Agricultural Supply; Water Contact Recreation; Non-Contact Water Recreation; Warm Freshwater Habitat; Wildlife Habitat; Groundwater Recharge
Cross Creek (Kaweah River, below Lake Kaweah)	Municipal and Domestic Water Supply; Agricultural Supply; Industrial Service Supply; Industrial Process Supply; Water Contact Recreation; Non-Contact Water Recreation; Warm Freshwater Habitat; Wildlife Habitat; Groundwater Recharge
Tule River (below Lake Success)	Municipal and Domestic Water Supply; Agricultural Supply; Industrial Service Supply; Industrial Process Supply; Water Contact Recreation; Non-Contact Water Recreation; Warm Freshwater Habitat; Wildlife Habitat; Groundwater Recharge
Poso Creek	Agricultural Supply; Water Contact Recreation; Non-Contact Water Recreation; Warm Freshwater Habitat; Cold Freshwater Habitat; Wildlife Habitat; Groundwater Recharge; Freshwater Replenishment
Kern River (below Southern California Edison Kern River Powerhouse No. 1)	Municipal and Domestic Water Supply; Agricultural Supply; Industrial Service Supply; Industrial Process Supply; Hydropower Generation; Water Contact Recreation; Non-Contact Water Recreation; Warm Freshwater Habitat; Wildlife Habitat; Rare, Threatened, or Endangered Species; Groundwater Recharge
Source: CVRWQCB 2004	

Several waterbodies within the project area and vicinity are listed on the State 303(d) List of Impaired Water Bodies. Table 7-2 lists details for each impaired waterbody within the project area and vicinity. Additional information regarding these waterbody's impairment is available in Attachment 3 (Post-Construction Stormwater Quality Standards and Water Quality Technical Report; also referred to as the "Technical Memorandum") as well as in Section 3.8.4 of the EIR/EIS (provided on CD-ROM under Other Requisite Material).

Table 7-2
Clean Water Act Section 303(d): Listed Water Bodies and Priority Pollutants in the Project Vicinity

Name	Pollutant	Source
San Joaquin River (Friant Dam to Mendota Pool) Exotic Species	Exotic species	Source unknown
Mendota Pool	Selenium	Agricultural return flows, agriculture, groundwater withdrawal, other
Kings River, Lower (Island Weir to Stinson and Empire Weirs)	Electrical conductivity	Agriculture
Kings River, Lower (Island Weir to Stinson and Empire Weirs)	Molybdenum	Agriculture
Kings River, Lower (Island Weir to Stinson and Empire Weirs)	Toxaphene	Agriculture
Kings River, Lower (Pine Flat Reservoir to Island Weir)	Chlorpyrifos	Agriculture
Kings River, Lower (Pine Flat Reservoir to Island Weir)	Unknown Toxicity	Source Unknown
Cross Creek (Kings and Tulare Counties)	Unknown Toxicity	Source unknown
Deer Creek (Tulare County)	pH (high), Unknown Toxicity	Source unknown

The Kings River in the vicinity of the project crossing is listed as impaired due to the presence of chloropyrifos, unknown toxicity, electrical conductivity, molybdenum, and toxaphene from agricultural and unknown sources; total maximum daily loads to address the impairments are under development. In addition, Cross Creek and Deer Creek are both listed for unknown toxicity and pH. The sources of the impairment in these cases are unknown.

The baseline condition of aquatic resources in the Fresno to Bakersfield Section of the HST project alignment footprint was evaluated using the California Rapid Assessment Method (CRAM) (Authority and FRA 2013f). CRAM scores for non-riverine and riverine wetlands for which access was available scored relatively low when compared to the theoretical maximum score because of the predominance of agricultural land uses and the large number of canals and ditches associated with water conveyance facilities and constructed agricultural drainage features. Additional information and CRAM results are provided in the Draft CMP. From CRAM scores, functions and values of potentially affected waterbodies in the PP1 corridor could be interpolated; these functions and values may be similar to beneficial uses that are supported by those waters. Baseline CRAM scores of waterbodies in the project area were used to evaluate project impacts on functions and values as well as to develop proposed mitigation to create, enhance, or restore the same functions and values as would be impacted by the project.

Because CRAM assessment of jurisdictional waters has not been completed and formal consultation with USACE through the Standard Operating Procedure for Determination of Mitigation Ratios (USACE 2012) has not been initiated for the mitigation sites, mitigation obligations to ensure no-net-loss of aquatic functions or services are not currently known.

Section 6
Water Body Impact

Section 6 Block 8: Water Body Impacts

This section identifies locations where fill material would impact water features, wetlands, and riparian areas, including canals and ditches, retention/detention basins, seasonal riverine, riparian, emergent wetland, seasonal wetland, vernal pools and swales. This section further describes general material types that may be used for each type of fill. This section also presents similar types of information about temporary disturbances or other related impacts on these aquatic resources.

The construction of PP1 of the Fresno to Bakersfield Section of the HST project would result in permanent and temporary discharges of material to vernal pools and swales, emergent wetlands, seasonal wetlands, retention/detention basins, seasonal riverine features, canals and ditches, and riparian area. A tabular presentation of project impacts on PP1 aquatic resources is provided in Attachment 4, Impacted Waterbodies in the PP1 Study Area.

Additional information on all aquatic resources identified in the PP1 study area is provided in the Preliminary Jurisdictional Waters and Wetlands Delineation Report and the Draft CMP. All aquatic features in PP1 have been reviewed by the USACE Sacramento District and a Preliminary Jurisdictional Determination was made on November 3, 2011, verifying the approximate location and extent of the mapped aquatic features. The preliminary jurisdictional determination issued by USACE includes all water features and USACE jurisdiction of those features is assumed for federal CWA Section 404 permitting purposes, so there are no waters of the State that are not assumed to be waters of the United States. Riparian areas associated with seasonal riverine features, which are regulated by CDFW, are also included in this 401 permit application to assure comprehensive information has been provided to the SWRCB for consideration.

Block 8a: Waterbody Name

Table 8-1 lists the major water crossings. Attachment 4, Impacted Waterbodies in the PP1 Study Area, provides the wetland identification numbers of the waterbodies in the PP1 study area for all water features. This information can be cross referenced with Attachment 5, the Project Impact Mapbook, which shows each of the crossings.

Block 8b: Fill and Excavation

The construction of PP1 of the Fresno to Bakersfield Section of the HST project will require discharge of fill material to various water features and wetlands. The fill would largely be in the form of concrete structures, gravel, or aggregate rock. This fill would be used in the construction of at-grade rail beds, elevated tracks or bridged rails, road overcrossings, and other project facilities.

Table 8-2 provides a summary of the impacts on waterbodies in the PP1 study area. Tables 8-3 to 8-5 summarize this information for each of the CPs. Table 8-6 provides the impact information by watershed. Approximately 101 acres of emergent wetlands, seasonal wetlands, vernal pools and swales, canals/ditches, retention/detention basins, seasonal riverine features, and riparian areas will be permanently impacted in PP1. Approximately 33 acres will have direct temporarily impacts. See also Attachment 5, Project Impact Mapbook, for the locations of these features.

Table 8-1
Major Waterbodies in the PP1 Study Area

Name	Feature ID	Basin Plan Watershed	CP	Direct Permanent Impacts (acres)	Direct Temporary Impacts (acres)	Direct Temporary No Fill (acres)	Impacted Creek Length (feet)
Cole Slough (Kings River Complex)	CCE22OW	Raisin	CP 2/3	0	0.03	0.11	102
Dutch John Cut (Kings River Complex)	CCE28OW	Raisin	CP 2/3	0	0.08	0.31	118
Old Kings River	CCE30OW	Hanford-Lemoore	CP 2/3	<0.01	0.11	0.23	75
Cross Creek	CCE79OW	Lake Sump	CP 2/3	0	0.02	0.26	130
Tule River	288BOW05	Tule Delta	CP 2/3	0.02	0.17	0.00	107
Deer Creek	337EOW01	Tule Delta	CP 2/3	<0.01	0.06	0.08	110
Poso Creek	478AOW01	Semitropic	CP 4	<0.01	0.02	0.10	203

CP = construction package

RFP No.: 13-57 – Addendum No. 5 - 10/09/2014

Table 8-2
PP1 - Acres of Impacts by Aquatic Resource Type

Type of Water	Aquatic Resource Type	Impact Type (acres)				
		Direct			Indirect Bisect	Total
		Permanent	Temporary	Temporary No Fill		
Wetlands	Emergent wetland	0.01	0.00	0.00	-	0.01
	Seasonal wetland	1.57	1.09	0.54	-	3.20
	Vernal pools and swales	5.63	0.00	0.00	11.54	17.17
Wetland subtotal		**7.21**	**1.09**	**0.54**	**11.54**	**20.38**
Other waters	Canals/Ditches	52.90	11.03	0.32	-	64.25
	Retention/detention basin	36.95	13.51	4.60	-	55.06
	Seasonal riverine	2.08	0.48	1.10	-	3.66
Other waters subtotal		**91.93**	**25.02**	**6.01**	**-**	**122.97**
Riparian		1.77	0.47	-	-	2.23
Total		**100.91**	**26.57**	**6.55**	**11.54**	**145.58**

Note: Due to rounding, the sums of impacts may not match by 0.01 acre.

* Indirect bisect impact acreages are areas where vernal pools or vernal swales are partially within the indirect impact area. The unique characteristics of these features prohibit them from being partially impacted; therefore, if any portion of a vernal pool or vernal swale is impacted the entire feature is included in the impact amount

Table 8-3
CP 1C - Acres of Impacts by Aquatic Resource Type

Type of Water	Aquatic Resource Type	Impact Type (acres)				
		Direct			Indirect Bisect	Total
		Permanent	Temporary	Temporary No Fill		
Wetlands	Emergent wetland	0.00	0.00	0.00		0.00
	Seasonal wetland	<0.01	0.00	0.00		<0.01
	Vernal pools and swales	0.00	0.00	0.00	0.00	0.00
Wetland subtotal		**<0.01**	**0.00**	**0.00**	**0.00**	**<0.01**
Other waters	Canals/Ditches	0.48	2.00	0.05		2.52
	Retention/detention basin	0.06	1.01	0.00		1.07
	Seasonal riverine	0.00	0.00	0.00		0.00
Other waters subtotal		**0.53**	**3.01**	**0.05**		**3.59**
Riparian		0.00	0.00			0.00
Total		**0.54**	**3.01**	**0.05**	**0.00**	**3.60**

Note: Due to rounding, the sums of impacts may not match by 0.01 acre.

* Indirect bisect impact acreages are areas where vernal pools or vernal swales are partially within the indirect impact area. The unique characteristics of these features prohibit them from being partially impacted; therefore, if any portion of a vernal pool or vernal swale is impacted the entire feature is included in the impact amount

RFP No.: 13-57 – Addendum No. 5 - 10/09/2014

Table 8-4
CP 2/3 - Acres of Impacts by Aquatic Resource Type

Type of Water	Aquatic Resource Type	Impact Type (acres)				
		Direct				
		Permanent	Temporary	Temporary No Fill	Indirect Bisect	Total
Wetlands	Emergent wetland	0.01	0.00	0.00		0.01
	Seasonal wetland	1.56	1.09	0.54		3.19
	Vernal pools and swales	1.01	0.00	0.00	3.25	4.26
Wetland subtotal		**2.59**	**1.09**	**0.54**	**3.25**	**7.47**
Other waters	Canals/Ditches	51.28	8.06	0.27		59.61
	Retention/detention basin	33.21	9.23	4.13		46.57
	Seasonal riverine	2.08	0.46	1.00		3.54
Other waters subtotal		**86.57**	**17.76**	**5.40**		**109.73**
Riparian		1.36	0.47			1.82
Total		**90.51**	**19.31**	**5.95**	**3.25**	**119.02**

Note: Due to rounding, the sums of impacts may not match by 0.01 acre.

* Indirect bisect impact acreages are areas where vernal pools or vernal swales are partially within the indirect impact area. The unique characteristics of these features prohibit them from being partially impacted; therefore, if any portion of a vernal pool or vernal swale is impacted the entire feature is included in the impact amount

Table 8-5
CP 4 - Acres of Impacts by Aquatic Resource Type

Type of Water	Aquatic Resource Type	Impact Type (acres)				
		Direct			Indirect Bisect	Total
		Permanent	Temporary	Temporary No Fill		
Wetlands	Emergent wetland	0.00	0.00	0.00		0.00
	Seasonal wetland	0.00	0.00	0.00		0.00
	Vernal pools and swales	4.62	0.00	0.00	8.28	12.90
Wetland subtotal		**4.62**	**0.00**	**0.00**	**8.28**	**12.90**
Other waters	Canals/Ditches	1.15	0.97	0.00		2.11
	Retention/detention basin	3.69	3.26	0.47		7.42
	Seasonal riverine	0.00	0.02	0.10		0.12
Other waters subtotal		**4.83**	**4.25**	**0.56**		**9.65**
Riparian		0.41	0.00			0.41
Total		**9.86**	**4.25**	**0.56**	**8.28**	**22.96**

Note: Due to rounding, the sums of impacts may not match by 0.01 acre.

* Indirect bisect impact acreages are areas where vernal pools or vernal swales are partially within the indirect impact area. The unique characteristics of these features prohibit them from being partially impacted; therefore, if any portion of a vernal pool or vernal swale is impacted the entire feature is included in the impact amount

RFP No.: 13-57 – Addendum No. 5 - 10/09/2014

Table 8-6
Acres of Impacts in the PP1 Study Area by Watershed

Basin Plan Watershed and Aquatic Resource Type	Direct Permanent Impact (acre)	Direct Temporary Impact (acre)	Indirect Bisect (acre)	Temporary No Fill (acres)
Fresno (51.3)				
Canals/Ditches	0.83	2.06	-	0.05
Retention/Detention Basins	0.06	1.01	-	0.00
Seasonal Wetland	0.00	0.00	-	0.00
Consolidated (51.7)				
Canals/Ditches	2.17	0.81	-	0.00
Retention/Detention Basins	0.03	0.00	-	0.00
Raisin (51.2)				
Seasonal Riverine	0.00	0.11	-	0.42
Riparian	0.81	0.20	-	-
Canals/Ditches	0.46	0.36	-	0.00
Hanford-Lemoore (51.9)				
Seasonal Riverine	0.00	0.11	-	0.23
Riparian	0.24	0.13	-	-
Canals/Ditches	2.33	0.47	-	0.16
Retention/Detention Basins	0.88	0.00	-	0.00
Kaweah Delta (58.1)				
Seasonal Riverine	2.05	0.00	-	0.00
Canals/Ditches	7.93	0.98	-	0.00
Retention/Detention Basins	0.75	0.00	-	0.00
Emergent Wetland	0.01	0.00	-	0.00
Lake Sump (58.3)				
Seasonal Riverine	0.00	0.02	-	0.26
Canals/Ditches	5.23	1.66	-	0.11
Retention/Detention Basins	3.18	6.85	-	0.03
Semitropic (58.7)				
Seasonal Riverine	0.00	0.02	-	0.10
Riparian	0.41	0.00	-	-
Canals/Ditches	0.58	0.84	-	0.00

Table 8-6
Acres of Impacts in the PP1 Study Area by Watershed

Basin Plan Watershed and Aquatic Resource Type	Direct Permanent Impact (acre)	Direct Temporary Impact (acre)	Indirect Bisect (acre)	Temporary No Fill (acres)
Retention/Detention Basins	0.93	0.10	-	0.00
Vernal Pools and Swales	4.62	0.00	8.28	0.00
Tule Delta (58.2)				
Seasonal Riverine	0.02	0.22	-	0.08
Riparian	0.31	0.14	-	-
Canals/Ditches	32.81	3.72	-	0.00
Retention/Detention Basins	28.36	2.39	-	4.10
Seasonal Wetland	1.56	1.09	-	0.54
Vernal Pools and Swales	1.01	0.00	3.25	0.00
North Kern (58.8)				
Canals/Ditches	0.57	0.12	-	0.00
Retention/Detention Basins	2.75	3.16	-	0.47
Total of All Resources Subject to Regulation Under the CWA Section 404[a]	99.15	26.11	11.54	6.55
Total Section 401 Riparian Water Body Type[b]	1.77	0.47	-	-
TOTAL 401 WATER FEATURE, WETLAND, AND OTHER WATER IMPACT	100.91	26.57	11.54	6.55

[a] The following resources have been assumed to be subject to regulation under the CWA Section 404: emergent wetlands, seasonal wetlands, vernal pools and swales, canals/ditches, retention/detention basins, and seasonal riverine (this total does not include CDFW jurisdictional riparian areas associated with seasonal riverine features. Feature updates will be provided to USACE to be incorporated into the final permit.

[b] Riparian areas associated with seasonal riverine features (CDFW jurisdictional).

The *Preliminary Jurisdictional Waters and Wetlands Delineation Report* (Authority and FRA 2011e), describes the methods used to identify jurisdictional wetlands and other waters of the United States in the project area and the wetlands and other waters of the United States in the study area surrounding the actual impacts. All aquatic surface water features are assumed jurisdictional under Section 404 of the CWA using the Preliminary Jurisdictional Determination approach defined in Regulatory Guidance Letter 08-02 (USACE 2008). After publication of the Revised DEIR/Supplemental DEIS in 2012, the Authority and USACE continued to coordinate regarding the delineation of wetlands and waters of the United States in the Wetland Study Area. During this period, the extent and classification of a number of wetlands and waters of the United States were revised, and in some instances new features were added. On February 5, 2013 the USACE issued a Preliminary Jurisdictional Determination, which incorporated these changes and

RFP No.: 13-57 – Addendum No. 5 - 10/09/2014

concurred with the measured areas and identified locations of wetlands and other waters of the United States.

The Preliminary Jurisdictional Waters and Wetland Delineation Report was prepared by the Authority and FRA, and the following individuals carried out the wetland delineation:

- Alexandra Fraser, Ph.D., Senior Project Biologist, URS
- Michael Monroe, Senior Regulatory Specialist, URS
- Justin Whitfield, Project Ecologist, URS
- Jan Novak, Senior Soil Scientist, URS
- Galen Peracca, Biologist, URS
- Ode Bernstein, Wildlife Biologist, URS
- Andrea Coleman, Biologist, URS
- Connor Dibble, Biologist, URS
- Fletcher Halliday, Biologist, URS
- David Pecora, Biologist, URS
- Chris Bente, GISP, Senior GIS Analyst, URS
- Jason Castaneda, GIS Specialist, URS
- Jeffrey Owen, GIS Specialist, URS

Block 8d: Runoff for Pre and Post-Project Implementation

The Authority is currently working with the SWRCB to develop a project-specific stormwater permitting approach which incorporates consistent stormwater selection criteria and design standards during the D/B phase of construction. After the Authority submits a Report of Waste Discharge, the SWRCB will issue an individual CWA Section 402 NPDES permit for the entire project. At this time, it is estimated that the project-specific 402 NPDES permit will be issued prior to completion of the construction portion of the project.

Attachment 3, Post-Construction Stormwater Quality Standards and Water Quality Technical Report, is a technical memorandum that provides the selection criteria and design standards that will be used for post-construction stormwater BMPs for the Fresno to Bakersfield Section of the HST System. These selection criteria and design standards are consistent with the criteria and standards submitted to the SWRCB as part of the Merced to Fresno 401 Water Quality Certification Application. It is anticipated that the post-construction BMP design standards presented Attachment 3 will be adopted as part of the federal CWA Section 401 Water Quality Certification for PP1 of the Fresno to Bakersfield Section.

To assure that runoff from all facilities is properly treated and controlled in the post-development condition to avoid and minimize impacts on receiving water quality and channel stability, treatment, and hydromodification control BMPs will be incorporated into the Fresno to Bakersfield Section HST project to meet the standards based on the Caltrans Statewide Storm Water Permit (Order No. 2012-0011-DWQ, adopted September 19, 2012, effective July 1, 2013) (SWRCB 2012) (Caltrans Permit), as set forth in the Attachment 3. As described in the Technical Memorandum, the incorporation of BMPs into the HST project that comply with the post-development runoff treatment and hydromodification control standards assure that post-development runoff controls will meet or exceed the post-development runoff control standards and requirements of Section XIII of the statewide NPDES General Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activities (Order No. 2009-0009-DWQ as modified by Order No. 2010-0014-DWQ, NPDES No. CAS000002, adopted September 2, 2009, effective July 1, 2010) (SWRCB 2009, Construction General Permit).

Block 8e: Type of Materials Discharged to Waters of the United States

The Fresno to Bakersfield section includes approximately 240 locations where fill would be placed into wetlands or other waters of the United States/waters of the State, or riparian areas. Table 8-7 shows the types and sources of fill materials that would be used in the construction of each project element. This is a D/B project, the level of design contained within this application is sufficient to provide a descriptive overview regarding the amount of fill material. The fill material types presented in Table 8-7 would be discharged as a result of the alignments, associated stations, and other features included in the project description, including infrastructure components, power stations, and maintenance facilities.

Table 8-7
Fill Material Types

<table>
<tr><th>Project Element</th><th>Type(s) of Fill</th><th>Fill Material(s) and Source(s)</th></tr>
<tr><td rowspan="9">Track Bed</td><td>Embankment</td><td>Structural backfill consisting of well-graded soils, gravels and stone compacted to a relative compaction of 95%; sources unknown at this time.</td></tr>
<tr><td>Ballast</td><td>Crushed stone, 0.75” to 2.5”; sources unknown at this time.</td></tr>
<tr><td>Sub-ballast (“Blanket Layer”)</td><td>Coarse-grained material (such as full crushed graduate gravel) between the ballast and subgrade, with 50% of crushed stone; sources unknown at this time.</td></tr>
<tr><td>Subgrade</td><td>Structural backfill consisting of imported well-graded soils; sources unknown at this time.</td></tr>
<tr><td>Geosynthetic Elements</td><td>Geotextiles (woven or non-woven), Geomembranes (synthetic or bituminous non-permeable by water), Geogrids (fine or coarse mesh); sources unknown at this time.</td></tr>
<tr><td>Pipe Culvert for Drainage</td><td>Reinforced Concrete Pipe precast using new materials sourced from existing commercial sites.</td></tr>
<tr><td>Box Culvert for Drainage or Wildlife Crossings</td><td>Reinforced Concrete Box Culvert precast using new materials sourced from existing commercial sites.</td></tr>
<tr><td>Structural Backfill of Culverts</td><td>Controlled low-strength material composed of workable mixture of aggregate, cementitious materials, water. Sources unknown at this time.</td></tr>
<tr><td>Sand Bedding of Culverts</td><td>Sand free of clay or organic material where 90% to 100% will pass through a No. 4 sieve, and no more than 5% will pass through a No. 200 sieve. Sources unknown at this time.</td></tr>
<tr><td rowspan="2">Erosion Control</td><td>Hydrostatic Filter Concrete Revetment Mattress</td><td>Double-layered geofabric casing injected with a fine aggregate concrete infill. Sources unknown at this time.</td></tr>
<tr><td>Gabion Box or Mat</td><td>Pre-made steel wire mesh cage laced together on site and filled with rock forming a durable basket. Sources unknown at this time.</td></tr>
</table>

Table 8-7
Fill Material Types

Project Element	Type(s) of Fill	Fill Material(s) and Source(s)
Bridge or Overpass	Concrete Girder	Reinforced concrete from existing commercial sites. Precast or Cast-in-Place (CIP) depending on geotechnical results.
	Concrete Pile	Reinforced concrete from existing commercial sites. Precast or CIP depending on geotechnical results.
	Concrete Foundation	Reinforced concrete from existing commercial sites. Precast or CIP depending on geotechnical results.
	Steel Rebar	Steel from existing commercial sites.
	Wall Backfill for CIP	Mechanically Stabilized Earth and drainage aggregate, sources unknown at this time.

The volume of fill for all aquatic resources was estimated by multiplying the GIS-derived area of each impact by a standard assumption of the depth of each type of aquatic resource. Conceptual depths are used to make volume estimations (see Table 8-8). This approach is used due to the early level of design complete at the time this permit application was prepared and because the large number of individual features prohibits an individual assessment of each feature's depth.

Table 8-8
Assumed Depth of Fill, by Aquatic Resource Type

Aquatic Resource	Depth (feet)
Emergent Wetland	1
Seasonal wetland	1
Vernal pool	0.5
Vernal swale	0.5
Canals and Ditches	8
Retention/Detention basin	10
Reservoir	12
Seasonal riverine	2
Riparian	1

Table 8-9 summarizes the estimated volume of fill material needed by each type of aquatic resource for direct permanent impacts. The estimated total volume of combined fill material is approximately 1,300,000 cubic yards for all waters impacted by the project and approximately 2,800 cubic yards for riparian areas. Temporary fill within the permanent impact area will be native to the project area, other than additional materials determined to be required for

construction integrity. The required fill material (e.g., ballast or concrete aggregates) will be obtained from existing quarries as close to the right-of-way as practicable.

Table 8-9
Fill by Aquatic Resource Type for Direct Permanent Impacts

Aquatic Resource	Surface Area (acres)				Volume (cubic yards)			
	CP 1C	CP 2/3	CP 4	PP1	CP 1C	CP 2/3	CP 4	PP1
Emergent wetland	0	0.01	0	0.01	0	20	0	20
Seasonal wetland	<0.01	1.56	0	1.57	7	2,524	0	2,530
Vernal pools and swales	0	1.01	4.62	5.63	0	815	3,728	4,543
Canals and ditches	0.48	51.28	1.15	52.90	6,132	661,857	14,793	682,781
Retention/ detention basin	0.06	33.21	3.69	36.95	926	535,719	59,466	596,111
Seasonal riverine	0	2.08	<0.01	2.08	0	6,717	6	6,722
Riparian	0	1.36	0.41	1.77	0	2,193	655	2,848
Total	0.54	90.51	9.86	100.91	7,065	1,209,845	78,647	1,295,557

Note: Due to rounding, the sums of volume may not match to the cubic yard.
CP = construction package
CY = cubic yards

8e-1 Impact Analysis

Potential impacts on water features, wetlands, or other waters were quantified by overlaying the current construction footprint and wetland study area boundary over delineated jurisdictional and riparian features. All aquatic surface water features are assumed jurisdictional under Section 404 of the CWA using the Preliminary Jurisdictional Determination approach. Riparian areas are also included in the impact analysis.

Figures 8-1 and 8-4 show a plan-view schematic of a stylized HST at-grade and elevated project and construction footprint. The light blue areas on Figures 8-1 and 8-4 show the temporary work areas. Temporary work areas include certain portions of elevated alignment right-of-way and acquired properties that will not house permanent structures or facilities. Figures 8-2 and 8-5 show how waters of the United States/waters of the State were delineated for the at-grade and elevated project and construction footprint. Figures 8-3 and 8-6 show how impacts on waters of the United States/waters of the State were quantified. The direct impact calculation methodology described below and illustrated in Figures 8-3 through 8-6 was used to calculate the impacts.

For purposes of evaluating impacts on jurisdictional waters, the area of potential impact generally consists of the two following areas:

- A 60- to 120-foot construction footprint for track segments.
- The project footprint for any project-related facilities or improvements (e.g., the Fresno to Bakersfield Section HST stations, power distribution facilities, water crossings, and/or maintenance facilities).

To determine the potential maximum direct impact, all aquatic resources and riparian areas present within the project footprint (for at-grade track or associated facilities) would be considered directly and permanently impacted by the construction of such facilities, with notable differences in how impacts are calculated between at-grade and elevated segments of the track alignment, as follows:

- For at-grade segments of the track alignment, all aquatic resources present within the project footprint would be considered directly and permanently impacted by the introduction of compacted soil and ballast material, and the construction of the track.
- For elevated segments of the track alignment:
  - All aquatic resources that receive fill from piers, abutments, or other structures in the construction footprint would be considered directly and permanently impacted. This is reported in the direct permanent category.
  - Any permanent impact on a portion of a vernal pool feature within the elevated construction footprint is considered to be a direct and permanent impact on the entire feature. This is reported in the direct permanent category.
  - All aquatic resources excluding vernal pools and riparian habitats, within the elevated construction footprint that are not filled would be considered directly and temporarily impacted. This is reported in the temporary, no fill category.
- Any vernal pool that is partially within the project footprint (at-grade track, elevated track, or project-related facilities) and within 250 feet of the project footprint (but is not subjected to fill) would be considered an indirect-bisect impact. This is reported in the indirect bisect category.
- Riparian areas would experience direct temporary and permanent impacts on riparian habitat. Direct permanent impacts include areas under the drip line of permanent structures. Direct temporary impacts are associated with construction activities. Temporarily impacted riparian areas can be restored. This approach represents the entire area where impacts may occur rather than the maximum extent of anticipated effects. This approach was used so that this application is consistent with the application for a master streambed alteration agreement under Section 1602 of the Fish and Game Code.

Potential indirect impacts on water features and wetlands include water quality degradation due to runoff, erosion, and siltation; hydrologic regime and water quality impairment caused by soil hardpan damage; surface water sedimentation; stream or wetland fragmentation; soil compaction; disruption of the upland micro watershed area; barriers to water flow (e.g., the rail bed); and potential changes in the quantity and quality of wetland and riparian plant communities from disturbance, shading, or introduction or spread of invasive plant species.

8e-2 Summary of Impacts on Waters, Wetlands, and Biological Resources

The construction of PP1 will affect biological resources (special-status plant communities, special-status species, water features, wetlands, other waters and wildlife movement patterns) within the temporary and permanent construction footprints. The most biologically significant plant communities identified within the alternatives are riparian and aquatic communities. Because temporary impacts on these plant communities will be mitigated through onsite restoration, the permanent impacts for PP1 are evaluated within this discussion.

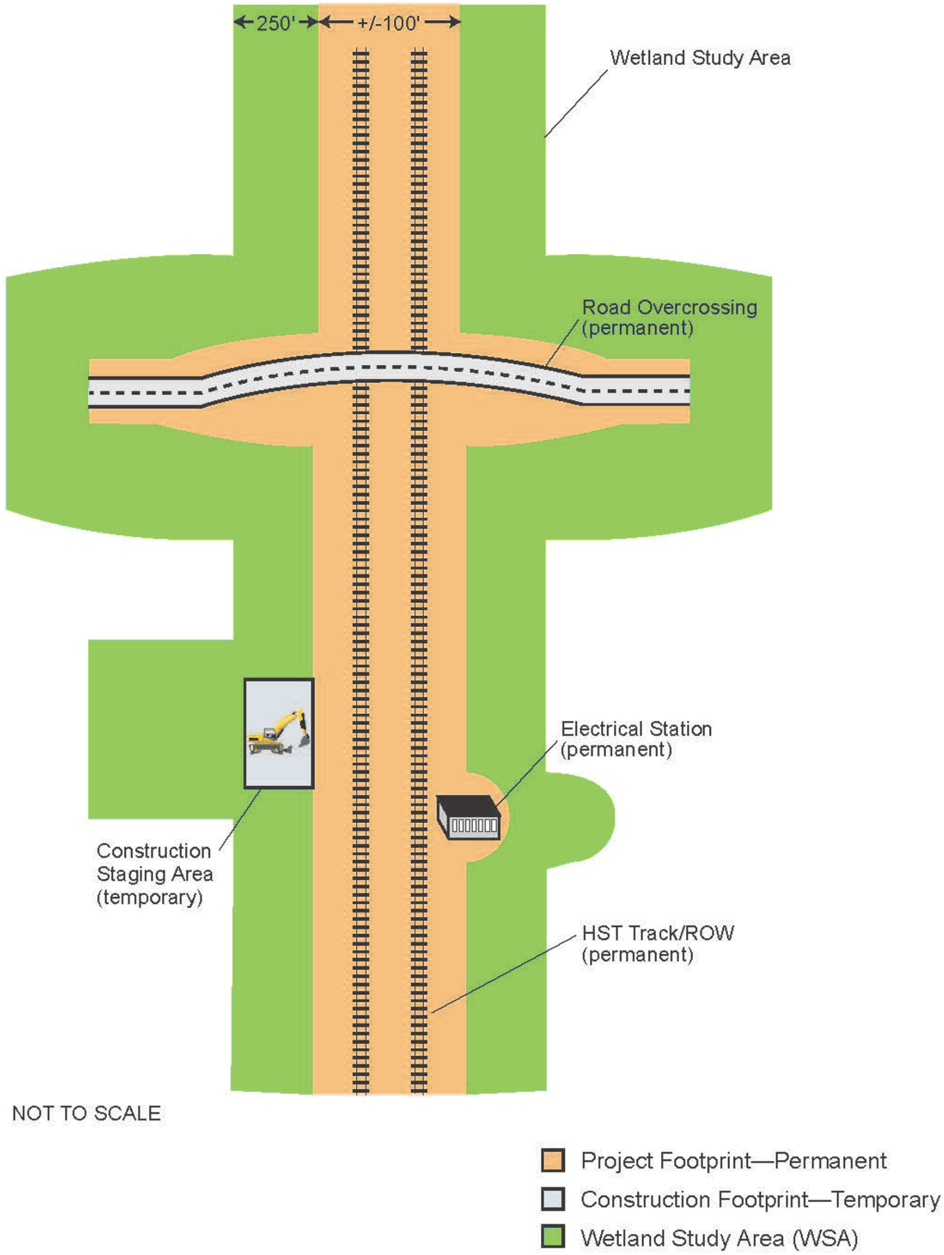


Figure 8-1
Project and Construction Footprint

RFP No.: 13-57 – Addendum No. 5 - 10/09/2014

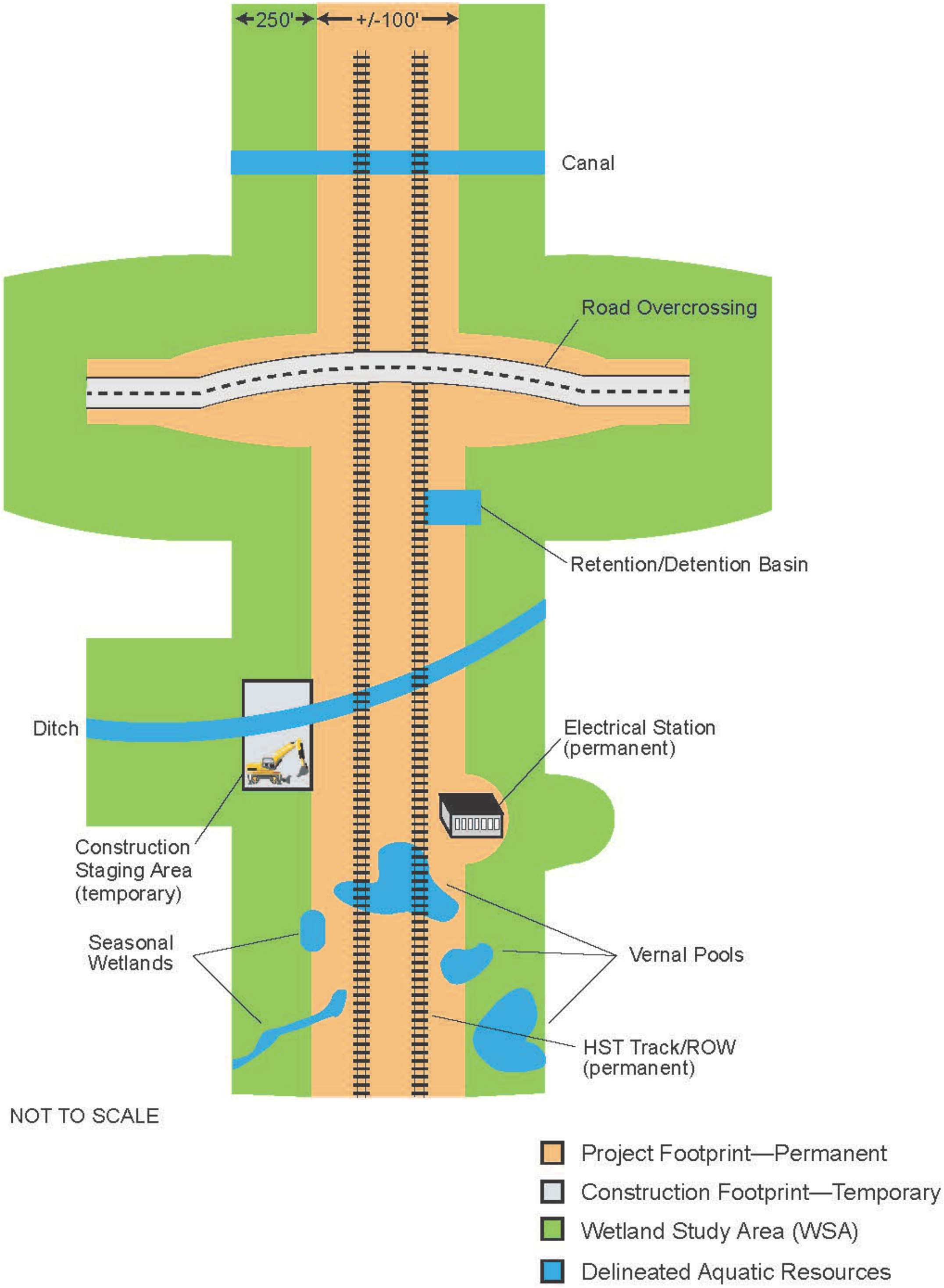
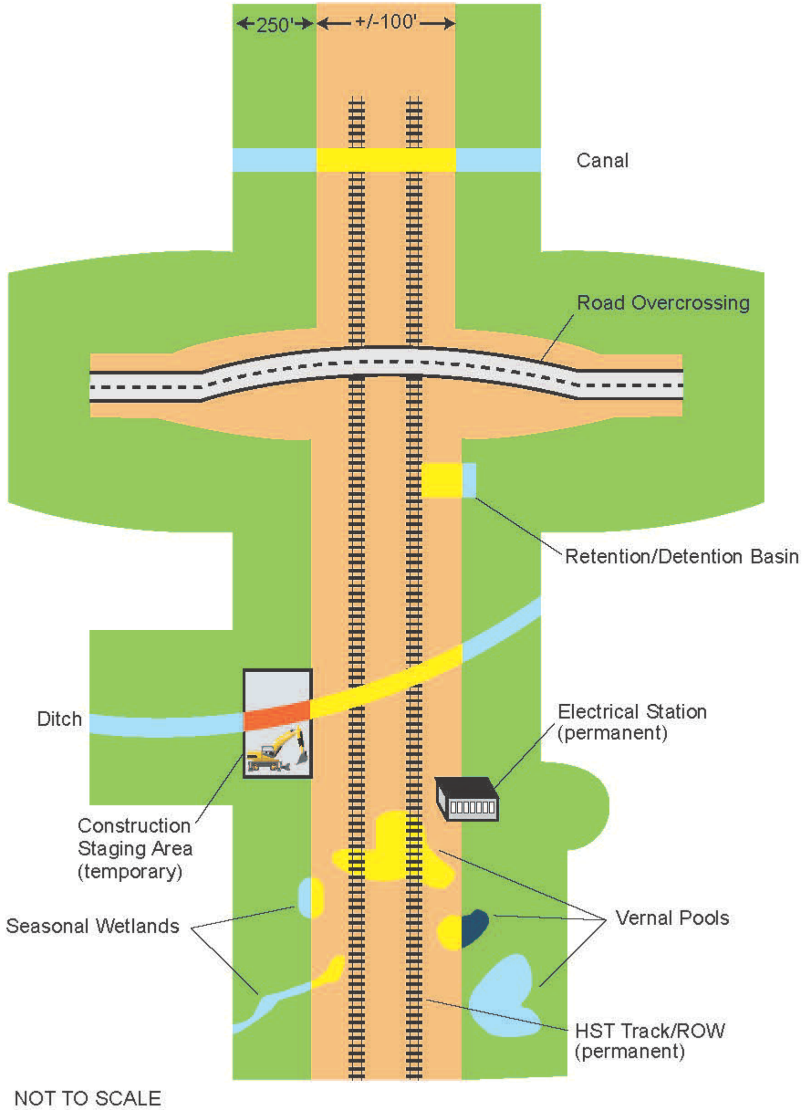


Figure 8-2
Wetland Delineation



- Project Footprint—Permanent
- Construction Footprint—Temporary
- Wetland Study Area (WSA)

Impacts to Aquatic Resources

- Direct-Permanent (Fill)
- Direct-Temporary (Fill)
- Indirect
- Indirect-Bisected (Vernal Pools and Vernal Swales only)

Figure 8-3
Construction and Project Impacts

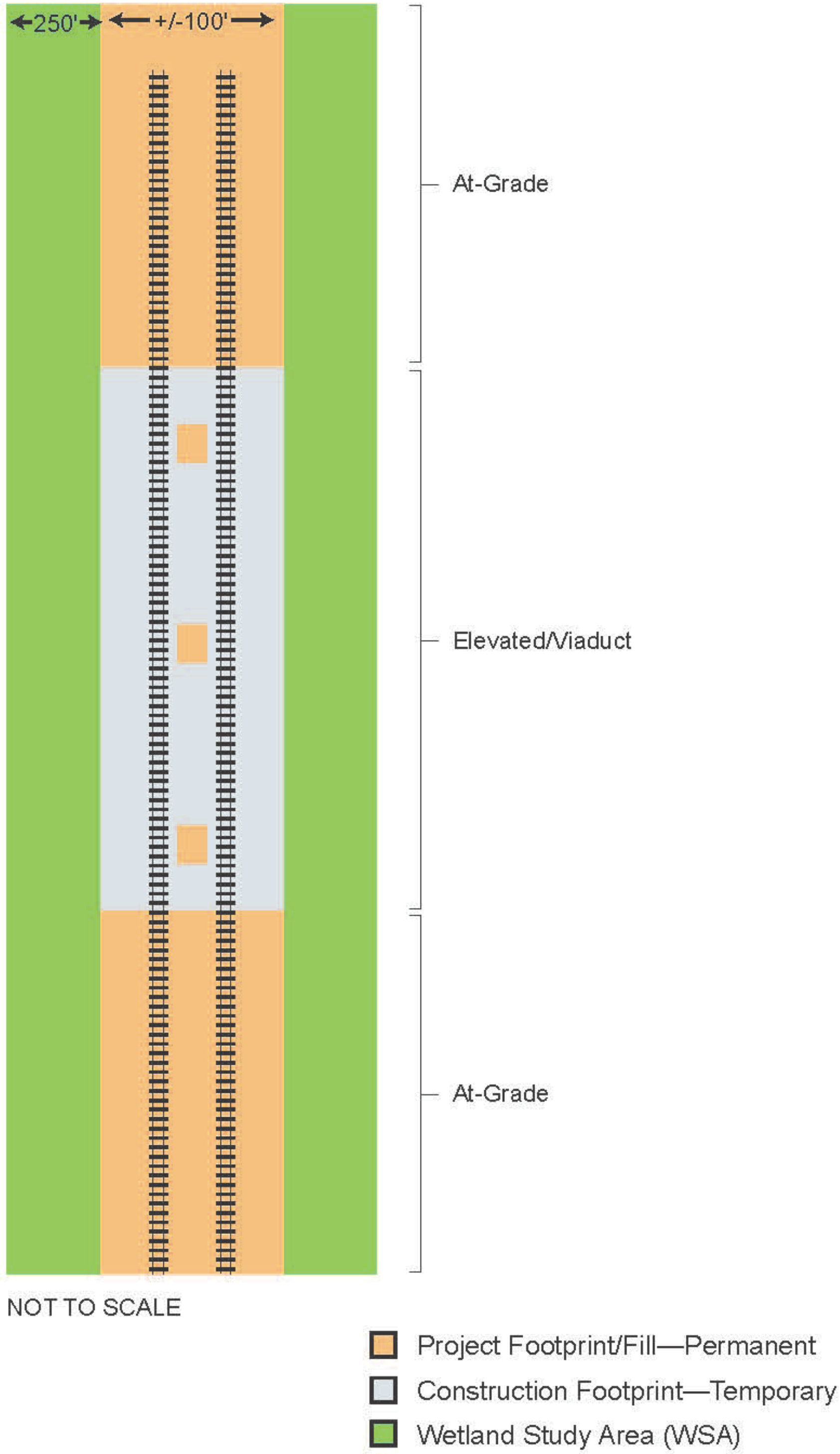


Figure 8-4
At-grade vs. Elevated

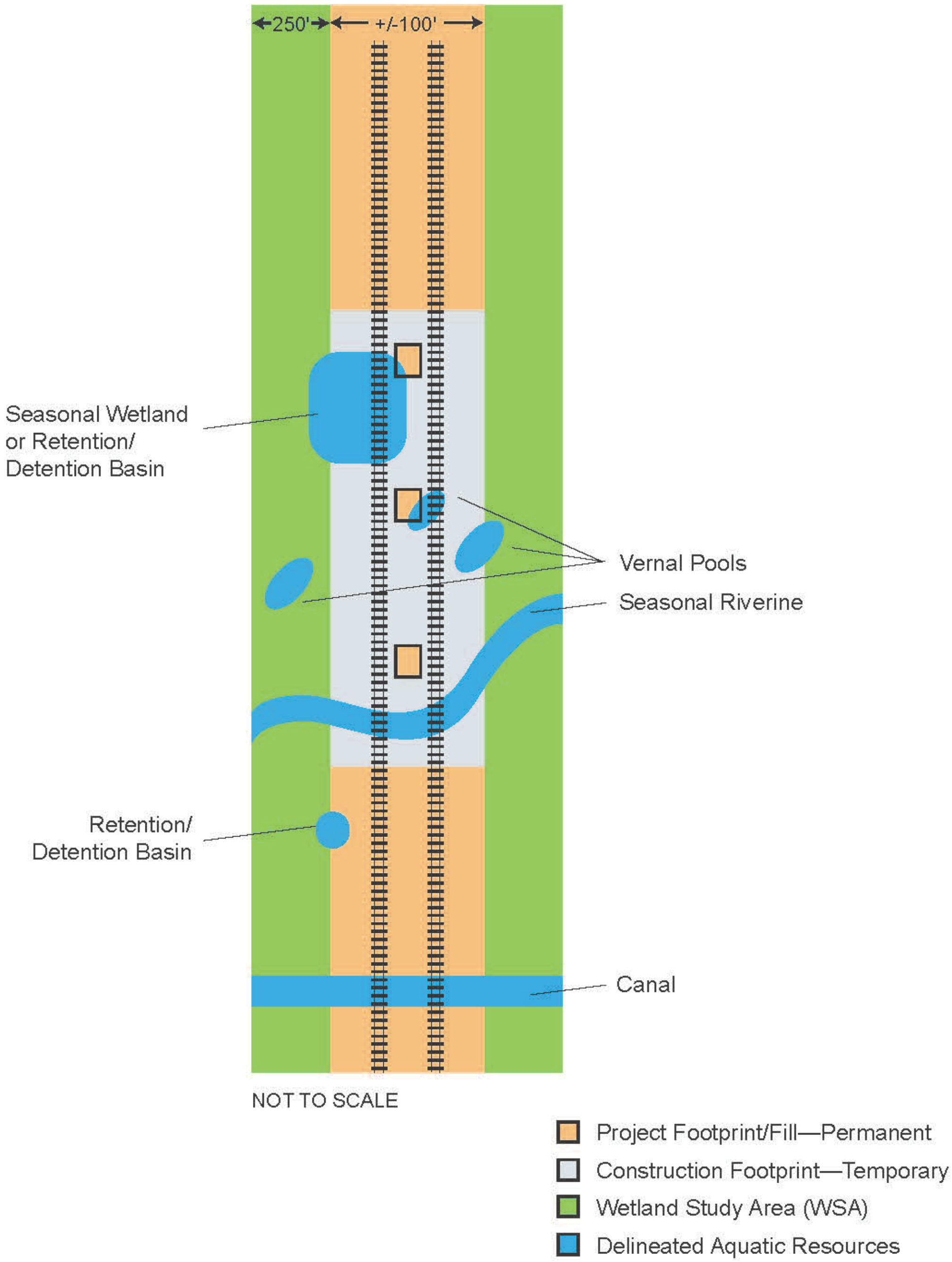


Figure 8-5
At-grade vs. Elevated Wetland Delineation

RFP No.: 13-57 – Addendum No. 5 - 10/09/2014

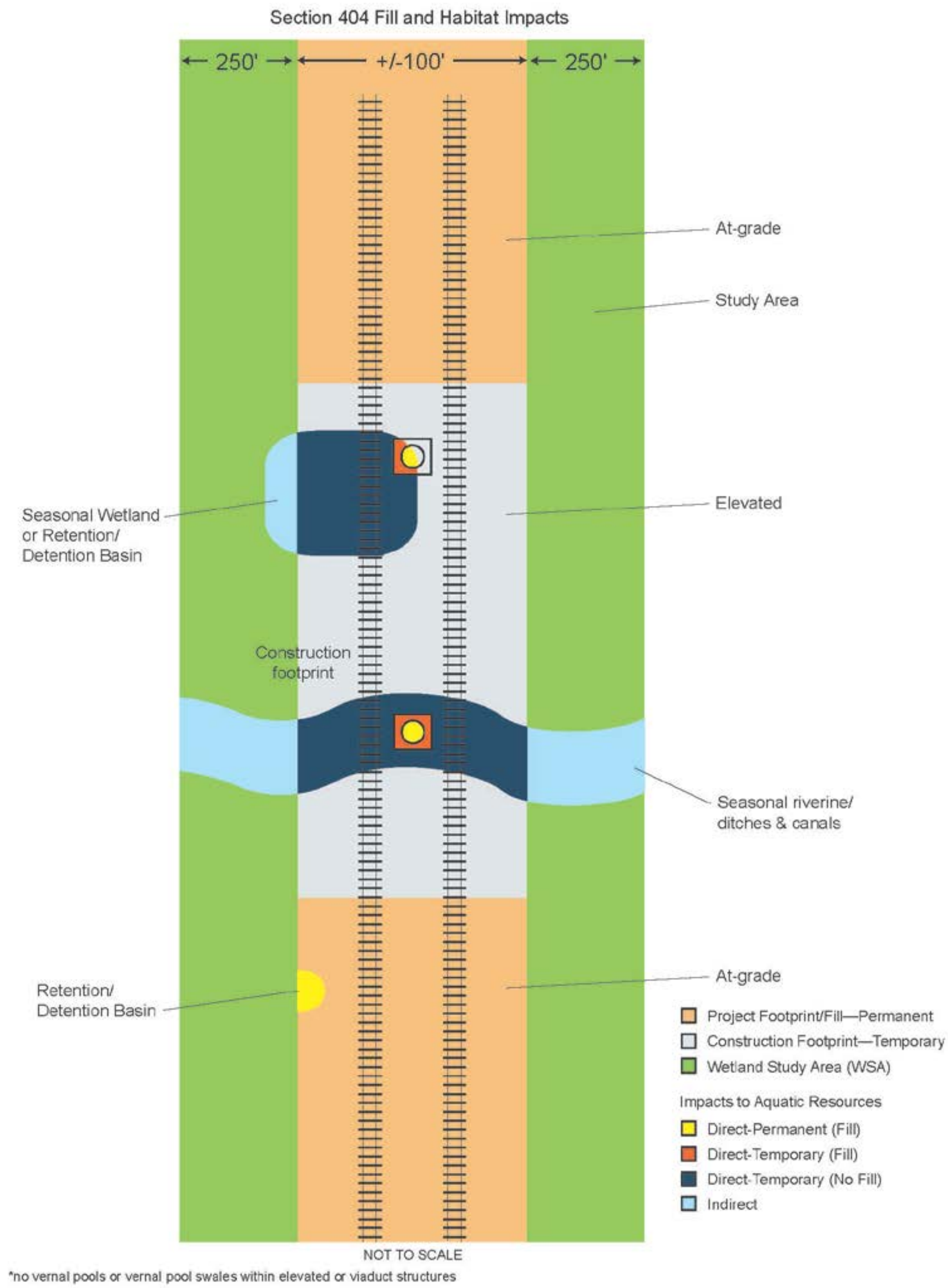


Figure 8-6
At-grade vs. Elevated Construction and Project Impacts

This page intentionally left blank

Section 7
Compensatory Mitigation

Section 7 Block 9: Compensatory Mitigation

The proposed project will provide mitigation measures to ensure its compliance with all applicable federal and state laws and regulations. A blend of strategies, BMPs, mitigation measures, and compensatory mitigation is proposed to ensure impacts are appropriately mitigated. These measures will address impacts on wetlands and other waters, as well as effects on special-status species and other biological resources that may be affected by the project. The range of strategies, BMPs, mitigation measures, and compensatory mitigation to reduce impacts on these resources includes onsite avoidance and minimization measures, as well as offsite compensatory mitigation.

A tabular presentation of the proposed mitigation ratios and mitigation acreage for impacts on PP1 aquatic resources is provided in Attachment 4, Impacted Waterbodies in the PP1 Study Area (updates provided when available). Potential mitigation properties for each of the CPs are listed in Table 9-1. This table depicts representative sites where mitigation for regulated impacts may occur; not all sites will necessarily be developed, nor is there a strict correspondence between a particular mitigation site and a CP. This table is instead intended to depict a means of mitigating all of the project's impacts as well as identifying mitigation sites that are appropriate to effects associated with each CP.

Table 9-1
Potential Mitigation Property Resources: Potential Acreage Available

Type of Water	Impact Acreage[a,b]	Resource Type	Potential Acreage Available		Potential Mitigation Property
Construction Package 1C					
Seasonal wetlands	< 0.01 ac	Seasonal wetland (reestablishment)	14 ac	4 ac	Peck Island
				10 ac	Panorama Vista Preserve
		Seasonal wetland (preservation)	41.3 ac	33.6 ac	Buena Vista Dairy
				0.1 ac	Staffel Family Trust
				4.1 ac	Davis
				0.8 ac	Valadez
				2.7 ac	Fagundes
Vernal pools and swales	--	Vernal pool (reestablishment)	2.9 ac	2.9 ac	Lazy K
Canals/ditches	2.52 ac	--	--	--	--
Retention/detention basins	1.07 ac	--	--	--	--
Construction Package 2/3					
Emergent wetlands	0.01 ac	Seasonal wetland (reestablishment)	14 ac	4 ac	Peck Island
				10 ac	Panorama Vista Preserve
		Seasonal wetland (preservation)	41.3 ac	33.6 ac	Buena Vista Dairy
				0.1 ac	Staffel Family Trust
				4.1 ac	Davis
				0.8 ac	Valadez
				2.7 ac	Fagundes

Table 9-1
Potential Mitigation Property Resources: Potential Acreage Available

Type of Water	Impact Acreage[a,b]	Resource Type	Potential Acreage Available		Potential Mitigation Property
Seasonal wetlands	3.19 ac	Seasonal wetland (reestablishment)	14 ac	4 ac	Peck Island
				10 ac	Panorama Vista Preserve
		Seasonal wetland (preservation)	41.3 ac	33.6 ac	Buena Vista Dairy
				0.1 ac	Staffel Family Trust
				4.1 ac	Davis
				0.8 ac	Valadez
				2.7 ac	Fagundes
Vernal pools and swales	4.26 ac	Alkali rain pool (reestablishment)	161-295 ac	161-295 ac	Old River Dairy
		Vernal pool (reestablishment)	11.6 ac	8.7 ac	Fagundes
				2.9 ac	Lazy K
		Vernal pool (preservation)	220.3 ac	83.7 ac	Buena Vista Dairy
				97.7 ac	Yang
				2.8 ac	Staffel Family Trust
				28.3 ac	Davis
				0.2 ac	Valadez
				7.6 ac	Fagundes
Canals/ditches	59.61 ac	--	--	--	--
Retention/detention basins	46.57 ac	--	--	--	--
Seasonal riverine	3.54 ac	Riverine (reestablishment)	6.6 ac	2.3 ac	Peck Island
				4.3 ac	River Ranch
		Riverine (preservation)	92.6 ac	14.7 ac	Fagundes
				31.7 ac	Peck Island
				17.4 ac	Panorama Vista Preserve
				28.8 ac	River Ranch
Riparian	1.82 ac	Riparian (establishment)	290.4 ac	157 ac	Peck Island
				45.5 ac	Panorama Vista Preserve
				87.9 ac	River Ranch
		Riparian (restoration/ enhancement)	160.2 ac	5.6 ac	Fagundes
				1.5 ac	Peck Island
				118.2 ac	Panorama Vista Preserve
				34.9 ac	River Ranch
		Riparian (preservation)	142.8 ac	100 ac	Peck Island
				33.5 ac	Panorama Vista Preserve
				9.3 ac	River Ranch

RFP No.: 13-57 – Addendum No. 5 - 10/09/2014

Table 9-1
Potential Mitigation Property Resources: Potential Acreage Available

Type of Water	Impact Acreage[a,b]	Resource Type	Potential Acreage Available		Potential Mitigation Property
Construction Package 4					
Vernal pools and swales	12.90 ac	Alkali rain pool (reestablishment)	161-295 ac	161-295 ac	Old River Dairy
		Vernal pool (reestablishment)	8.7 ac	8.7 ac	Fagundes
		Vernal pool (preservation)	220.3 ac	83.7 ac	Buena Vista Dairy
				97.7 ac	Yang
				2.8 ac	Staffel Family Trust
				28.3 ac	Davis
				0.2 ac	Valadez
				7.6 ac	Fagundes
Canals/ditches	2.11 ac	--	--	--	--
Retention/detention basins	7.42 ac	--	--	--	--
Seasonal riverine	0.12 ac	Riverine (reestablishment)	6.6 ac	2.3 ac	Peck Island
				4.3 ac	River Ranch
		Riverine (preservation)	92.6 ac	14.7 ac	Fagundes
				31.7 ac	Peck Island
				17.4 ac	Panorama Vista Preserve
				28.8 ac	River Ranch
Riparian	0.41 ac	Riparian (establishment)	290.4 ac	157 ac	Peck Island
				45.5 ac	Panorama Vista Preserve
				87.9 ac	River Ranch
		Riparian (restoration/ enhancement)	160.2 ac	5.6 ac	Fagundes
				1.5 ac	Peck Island
				118.2 ac	Panorama Vista Preserve
				34.9 ac	River Ranch
		Riparian (preservation)	142.8 ac	100 ac	Peck Island
				33.5 ac	Panorama Vista Preserve
				9.3 ac	River Ranch

— = no impact or not applicable

Notes:

[a] Calculations are based on raw, unrounded GIS source data for direct permanent, temporary, and temporary no fill impacts and indirect bisect impacts. As a result, the subtotals and totals do not match the sum of the rounded feature values presented in the table.

[b] The subcategory "Bisected" quantifies impacts on features that are bisected by the boundary of the project footprint (i.e., where a vernal pool or swale straddles the boundary of the project footprint). This category presents the acreage for the portion of these features that lies outside the project footprint but within the 250-foot buffer.

GIS = Geographic Information System

Draft Compensatory Mitigation Plan

The Draft Compensatory Mitigation Plan (CMP) is being prepared to support permit applications for PP1 of the Fresno to Bakersfield Section of the California HST project. It has been developed to address the compensatory mitigation requirements of the following permits:

- USACE CWA Section 404 permit
- SWRCB CWA Section 401 Water Quality Certification
- USFWS Section 7 BO under the federal ESA
- CDFW California Fish and Game Code Section 2081 permit under the California ESA
- CDFW California Fish and Game Code Section 1602 Streambed Alteration Agreement

The format and organization of the CMP addresses the information needs outlined in the interagency templates for habitat mitigation and monitoring plans (USACE 2004) and long-term management plans (USACE and EPA 2008).

The California Rapid Assessment Method (CRAM) was used to assess condition and extrapolate the functions and values of waterbodies within the Fresno to Bakersfield Section. The Draft CMP describes the potential mitigation sites that the Authority may use for offsetting impacts on jurisdictional resources within PP1. For the purposes of Section 401 of the CWA, the CMP includes compensatory mitigation for the proposed project's direct, physical impacts on water features, wetlands, and other waters. Compensatory mitigation addresses beneficial uses of the affected waterbodies and mitigates for unavoidable impacts. In addition, appropriate mitigation will result in no net loss of wetlands, pursuant to federal and state policies (Section 370 of the Water Resources Development Act of 1990 and Executive Order W-59-93, respectively).

The proposed mitigation activities may consist of restoration, enhancement, establishment, preservation, and long-term management of wetlands, waters of the State, and native vegetation communities. Restoration and establishment of vernal pools will be based on the existing conditions of onsite vernal pools and those on nearby reference sites. Mitigation for impacts on water features, wetlands, and riparian areas, including canals and ditches, retention/detention basins, seasonal riverine, riparian, seasonal wetland, emergent wetland, vernal pools and swales will completed at 10 of the 12 permittee-responsible mitigation sites identified in the CMP. This CMP can comprehensively achieve the mitigation requirements anticipated in the forthcoming PP1 environmental permits and authorizations (i.e., under CWA Sections 401 and 404 and California Fish and Game Code Sections 1602 and 2081), as well as the USFWS BO, by creating, enhancing, restoring and/or permanently protecting habitats with high conservation values. In addition to the permittee-responsible mitigation described in the CMP, the Authority is investigating the use of existing agency-approved mitigation/conservation banks, appropriate in-lieu-fee programs, or project-specific mitigation to ensure that adequate compensatory mitigation is available to offset the impacts on jurisdictional resources within PP1.

The final CMP will be developed based on the Draft CMP and on comments received from the USACE, SWRCB, USFWS, and CDFW, and will identify agreed-upon compensatory mitigation ratios developed pursuant to the Standard Operating Procedures promulgated by USACE, as well as the mitigation sites for all restored, enhanced, and preserved mitigation habitat. The CMP will also be consistent with the following mitigation measure identified in the EIR/EIS. Mitigation measures identified in the Final EIR/EIS are project commitments that must be implemented.

Mitigation Strategies

The selection of mitigation strategies is based on the April 2008 Final Mitigation Rule developed by the USACE and the EPA to govern compensatory mitigation for authorized impacts on wetlands, streams, and other waters of the United States (40 CFR Section 230.91). Those

regulations are designed to improve the effectiveness of compensatory mitigation to replace lost aquatic resource functions and area, expand public participation in compensatory mitigation decision making, and increase the efficiency and predictability of the mitigation project review process.

Major strategies selected to effectively mitigate for impacts on wetlands and other waters include the following:

- Development of appropriate minimization techniques, including construction training and construction monitoring, as well as implementation of appropriate engineering controls, the Storm Water Pollution Prevention Plan (SWPPP), and appropriate dewatering techniques to reduce the effects on the aquatic system.
- Development and implementation of a CMP. The plan is currently being worked on with agency coordination. The mitigation for the loss of aquatic resources would be commensurate with the impacts on wetlands and functions lost. In general, compensatory mitigation includes the restoration, enhancement, establishment and preservation of aquatic systems. The CMP would detail how the project would offset the loss of wetland functions and services (values) through, in order of preference:
  - Purchase of USACE-approved wetland mitigation bank credits. To the maximum extent possible, permanent impacts on wetlands will be compensated for by purchase of wetland credits. This will occur at a minimum ratio of 1:1.
  - Contribute to an in-lieu fee program as approved by USACE and other regulatory agencies.
  - Develop a permittee-responsible mitigation site(s) under a watershed approach.
  - Develop permittee-responsible onsite and /or in-kind mitigation.

This strategy includes the onsite restoration and/or improvement of all temporarily disturbed wetlands and other waters within the project footprint.

Mitigation Measures

Mitigation measures from the Final Fresno to Bakersfield Section EIR/EIS (Authority and FRA 2014) that minimize impacts on wetlands and other waters are described below.

Bio-MM#7. Delineate Environmentally Sensitive Areas and Environmentally Restricted Areas (on plans and in-field). Before the start of ground-disturbing activities, the Project Biologist will verify that Environmentally Sensitive Areas (ESAs) and Environmentally Restricted Areas (ERAs) are delineated on final construction plans (including grading and landscape plans) and in the field, and will update as necessary. ESAs are areas within the construction zone, or on compensatory mitigation sites, containing suitable habitat for special-status species and habitats of concern that may allow construction activities but have restrictions based on the presence of special-status species or habitats of concern at the time of construction. ERAs are sensitive areas that are typically outside the construction footprint that must be protected in place during all construction activities.

Before and during the implementation of ground-disturbing activities, the Project Biologist will mark ESAs and ERAs with high-visibility temporary fencing, flagging, or other agency-approved barriers to prevent encroachment of construction personnel and equipment. Sub-meter accurate Global Positioning System equipment will be used to delineate all ESAs and ERAs. The Contractor will remove ESA and ERA fencing when construction is complete or when the resource has been cleared in accordance with agency permit conditions as reflected in the Mitigation Monitoring and Reporting Program (MMRP) and construction drawings and specifications. The Project Biologist

will submit a memorandum regarding the field delineation and installation of all ESAs/ERAs to the Mitigation Manager.

Bio-MM#9. Equipment Staging Areas. Before the start of ground-disturbing activities, the Project Biologist will confirm that staging areas for construction equipment are outside areas of sensitive biological resources, including habitat for special-status species, habitats of concern, and wildlife movement corridors, to the extent feasible. The Project Biologist will submit a memorandum to the Mitigation Manager to document compliance with this measure.

Bio-MM#19. Seasonal Vernal Pool Work Restriction. For seasonal avoidance of special-status vernal pool branchiopods and vernal-pool-dependent species (e.g., vernal pool branchiopods, western spadefoot toads, California tiger salamanders), the Contractor will not work within 250 feet of suitable aquatic habitats (e.g., vernal pools, seasonal wetlands) from October 15 to June 1 (corresponding to the rainy season) or as determined through informal or formal consultation with the USFWS or USACE. Ground-disturbing activities may begin once the habitat is no longer inundated for the season and it is after April 15. If any work remains to be completed after October 15, the Project Biologist will install exclusion fencing and erosion control measures in those areas where construction activities need to be completed. The Project Biologist will document compliance through memoranda to the Mitigation Manager during the establishment of the fencing activities.

Bio-MM#20. Implement and Monitor Vernal Pool Protection. Although all temporary impacts on vernal pools are considered to be permanent and will be mitigated through offsite compensatory mitigation (see BIO-MM#63), vernal pools that can be avoided within the temporary construction footprint will be protected by erecting exclusion fencing. The Project Biologist will erect and maintain the exclusion fencing.

For impacts on vernal pools within the temporary construction footprint that cannot be avoided, the Project Biologist will place rinsed gravel within the affected vernal pools and will cover the affected vernal pools with geotextile fabric before the start of ground-disturbing activities to minimize damage to the soils and protect the contours. The Project Biologist will collect a representative sampling of soils from the vernal pools before initiating ground-disturbing activities within the vernal pools. The representative soil samples will contain viable plant seeds and vernal pool branchiopod cysts to be preserved from the vernal pools. These samples may be incorporated into other vernal pools, as applicable, with USFWS and/or CDFW consultation. The Contractor will implement these measures within temporary impact areas adjacent to or within the construction footprint. Resource agency consultations with the USFWS and USACE will occur as needed and based on permit conditions.

The Project Biologist will submit a memorandum on a weekly basis or at other appropriate intervals to the Mitigation Manager to document compliance with this measure.

Because impacts on vernal pools within the temporary construction footprint are considered to be permanent, these impacts will be mitigated through offsite mitigation, as described in BIO-MM#63. The Contractor will obtain approval from USACE, before the implementation of the above-described mitigation measures, for any unanticipated temporary impacts on vernal pools. If unanticipated temporary impacts last more than one full wet-dry season cycle, offsite mitigation will be implemented.

Bio-MM#48. Restore Temporary Impacts on Jurisdictional Waters. During or after the completion of construction, the Contractor will restore disturbed jurisdictional waters to original topography using stockpiled and segregated soils. In areas where gravel or geotextile fabrics have been placed to protect substrate and minimize impacts on jurisdictional waters, these materials will be removed and affected features will be restored. The Contractor will conduct

revegetation using appropriate plants and seed mixes. The Authority will conduct maintenance monitoring in a manner consistent with the provisions in the Comprehensive Mitigation and Monitoring Plan (CMMP) (BIO-MM#62). The Project Biologist will submit a memorandum, on a weekly basis or at other appropriate intervals, to the Mitigation Manager to document compliance with this measure.

Bio-MM#49. Monitor Construction Activities within Jurisdictional Waters. During ground-disturbing activities, the Project Biologist and Project Biological Monitor will conduct monitoring within and adjacent to jurisdictional waters, including monitoring of the installation of protective devices (silt fencing, sandbags, fencing, etc.), installation and/or removal of creek crossing fill, construction of access roads, vegetation removal, and other associated construction activities. The Project Biological Monitor will conduct biological monitoring to document adherence to habitat avoidance and minimization measures addressed in the project mitigation measures, including, but not limited to, the provisions outlined in BIO-MM#5, BIO-MM#7, BIO-MM#8, BIO-MM#10, BIO-MM#12 through BIO-MM#15, BIO-MM#47, and BIO-MM#48. The monitor will also document adherence to all relevant conservation measures as listed in the USFWS, CDFW, SWRCB, and USACE permits. The Project Biologist will submit a memorandum, on a weekly basis or at other appropriate intervals, to the Mitigation Manager to document compliance with this measure.

Compensatory Mitigation

Unavoidable impacts on water features, wetlands, and other waters will require compensatory mitigation. The proposed project will provide mitigation measures in compliance with all applicable federal and state laws and regulations. To comply with these laws, various mitigation or compensation strategies are being developed in the Draft CMP in conjunction with mitigation ratio development using the Standard Operating Procedures for Determination of Mitigation Ratios (USACE 2012). These strategies will address impacts on water features, wetlands, and other waters, as well as effects on special-status species and other biological resources that may be affected by the HST project. The range of strategies to mitigate for impacts on these resources includes onsite avoidance and minimization measures, as well as onsite and/or offsite compensatory mitigation. Mitigation Measures BIO-MM#62 and BIO-MM#63 provide more details on the compensation for impacts on jurisdictional waters.

BIO-MM#62. Prepare and Implement a Site-Specific Comprehensive Mitigation and Monitoring Plan. As part of the USFWS, USACE, SWRCB, and CDFW permit applications, and before the start of ground-disturbing activities, the Authority will prepare a CMMP to mitigate for temporary and permanent impacts on biological resources (i.e., special-status wildlife, jurisdictional waters, and riparian areas). In the CMMP, performance standards, including percent cover of native species, survivability, tree height requirements, wildlife use of the area, the acreage basis, restoration ratios, and the combination of onsite and/or offsite mitigation will be detailed. Preference will be given to conducting the mitigation within the same HUC-8 or HUC-6 watershed where the impact occurs. The Project Biologist will work with the USACE, SWRCB, and CDFW to develop appropriate avoidance, minimization, mitigation, and monitoring measures to be incorporated into the CMMP. The CMMP will outline the intent to mitigate for the lost conditions, functions, and values of the impacted jurisdictional waters and state streambeds in a manner consistent with resource agency requirements and conditions presented in Sections 404 and 401 of the CWA and Section 1600 of the California Fish and Game Code. The CMMP will incorporate the following standard requirements in a manner consistent with USACE, SWRCB, and CDFW guidelines:

- Description of the project impact/site.
- Goal(s) (i.e., functions and values or conditions) of the compensatory mitigation project.
- Description of the proposed compensatory mitigation site.

- Implementation plan for the proposed compensatory mitigation site.
- Maintenance activities during the monitoring period.
- Monitoring plan for the compensatory mitigation site.
- Completion of compensatory mitigation.
- Financial assurances.
- Contingency measures.

Also, the following will be included at a minimum for the implementation plan:

- Site analysis for appropriate soils and hydrology.
- Site preparation specifications based on site analysis, including but not limited to grading and weeding.
- Soil and plant material salvage from impact areas, as appropriate to the timing of impact and restoration as well as the location of restoration sites.
- Specifications for plant and seed material appropriate to the locality of the mitigation site.
- Specifications for site maintenance to establish the habitats, including but not limited to weeding and temporary irrigation.

Habitat preservation, enhancement, and/or establishment or restoration activities will be conducted on some of the compensatory (i.e., selected permittee-responsible) mitigation sites to achieve the mitigation goals. A detailed design of the mitigation habitats will be created in coordination with the permitting agencies and be described in the CMMP. It is recognized that several CMMPs will be developed consistent with the selected mitigation sites and the resources mitigated at each. The primary engineering and construction contractors will ensure, through coordination with the Project Biologist, that construction is implemented in a manner that minimizes disturbance of such areas. Temporary fencing will be used during construction to avoid sensitive biological resources that are next to construction areas and can be avoided.

Performance standards are targets for determining the effectiveness of the mitigation and assessing the need for adaptive management (e.g., mitigation design or maintenance revisions). The performance standards are developed so that progress towards meeting final success criteria can be assessed on an annual basis; the standard for each year is progressively closer to the final criteria (e.g. vegetation cover standards may increase annually until reaching the success criteria objective in the final year of monitoring). Success criteria are formal criteria that must be met after a specific timeframe to meet regulatory requirements of the permitting agencies. Where applicable, replacement planting/seeding will be implemented if monitoring demonstrates that performance standards or success criteria are not met during a particular monitoring interval.

The performance standards will be used to determine whether the habitat improvement is trending toward sustainability (i.e., reduced need for human intervention) and to assess the need for adaptive management. These standards must be met for the habitat improvement to be declared successful, both during a particular monitoring year and at the end of the establishment period. These performance standards will be developed in consultation with the permitting agencies and as described in the CMMP.

The final success criteria will be developed in coordination with the regulatory agencies and presented in the CMMP. Examples of success criteria, which could be included in the CMMP, and would be assessed at the end of the monitoring period (assumed to be 5 years or as directed by agencies), include:

- Percent survival of planted trees (65–85%, depending on species and habitat).
- Percent absolute cover of highly invasive species, as defined by the California Invasive Plant Council (<5%).
- Percent total absolute cover of plant species (50-80%, depending on habitat type).

- Designed wetlands will meet USACE criteria for hydrophytic vegetation, hydric soils, and hydrology as defined in the "Corps of Engineers wetland delineation manual" (Environmental Laboratory 1987).
- Designed vernal pools and seasonal wetlands will meet inundation and seasonal drying requirements as specified in the design and indicated by agencies.
- Species composition and community diversity, relative to reference sites, and/or as described in the guidelines issued by permitting agencies (e.g., USFWS conservation guidelines for valley elderberry longhorn beetle).

Performance standards and success criteria will be provided for each of the years of monitoring and will be specific to habitat types at each permittee-responsible mitigation site. The monitoring schedule will be detailed in the site-specific CMMPs. To be deemed successful, the site will be required to meet the performance standards established for the year in which monitoring is being conducted (e.g., monitoring conducted at intervals with increasing performance requirements). However, if performance standards are not met in specific years, remedial measures, such as regrading, adjustment to modify the hydrological regime, and/or replacement planting or seeding, must be implemented and that year's monitoring must be repeated the following year until the performance standards are met. The success criteria specified must be reached without human intervention (e.g., irrigation, replacement plantings) aside from maintenance practices described in the site-specific CMMPs for maintenance during the establishment period.

The Project Biologist will oversee the implementation of all CMMP elements and monitor the results in a manner consistent with the prescribed maintenance and performance monitoring requirements.

The Project Biologist will prepare annual monitoring reports for 5 years (or less if success criteria are met as described earlier) and/or other documentation prescribed in the resource agency permits. The Project Biologist will submit a memorandum to the Mitigation Manager to document compliance with this measure.

Bio-MM#63. Compensate for Permanent and Temporary Impacts on Jurisdictional Waters. The Authority will mitigate permanent and temporary wetland impacts through compensation determined in consultation with the USACE, SWRCB, USFWS, and CDFW, in order to be consistent with the CMMP (BIO-MM#62). Regulatory compliance for jurisdictional waters includes relevant terms and conditions from the USACE 404 Permit, SWRCB 401 Permit, and CDFW 1600 Streambed Alteration Agreement.

Compensation will include aquatic resources restoration, establishment, enhancement, or preservation through one or more of the following methods:

- Purchase of credits from an agency-approved mitigation bank.
- Fee-title-acquisition of natural resource regulatory agency-approved property.
- Permittee-responsible mitigation through the purchase or establishment of a conservation easement or other permanent site protection method with financial assurance for long-term management of the property-specific conservation values.
- In-lieu fee contribution determined through negotiation and consultation with the various natural resource regulatory agencies.

The following ratios are proposed as a minimum for compensation for permanent impacts; final ratios will be determined in consultation with the appropriate agencies:

- Vernal pools: 2:1.
- Seasonal wetlands: between 1.1:1 and 1.5:1 based on impact type and function and values lost.
  - 1:1 offsite for permanent impacts.
  - 1:1 onsite and 0.1:1 to 0.5:1 offsite for temporary impacts.

The Authority will mitigate impacts on jurisdictional waters by replacing, creating, restoring, enhancing or preserving aquatic resource at the ratios presented above or other ratios, as determined in consultation with the appropriate agencies, which compensates for functions and values lost. The Authority will consider modifying the vernal pool mitigation ratios in the final permits based on site-specific conditions and the specific life history requirements of vernal pool branchiopods, California tiger salamander, and western spadefoot toad.

Through the CMMP reporting program and the applicable terms and conditions from the USACE 404 Permit, SWRCB 401 Permit, and the CDFW 1600 Streambed Alteration Agreement, the Project Biologist will document compliance and submit the documentation to the Mitigation Manager.

Section 8
Threatened and Endangered Species

Section 8 Block 10: Threatened and Endangered Species

Consultations with the NMFS and the USFWS for the Fresno to Bakersfield Section, pursuant to Section 7 of the federal ESA, lead to the issuance of a No Effect Determination Letter submitted to NOAA Fisheries in June 2011 and a BO from USFWS in February 2013.

Block 10a: NMFS No Effect Determination

In a No Effect Determination letter submitted to NMFS by the Authority on June 24, 2011 the Authority determined that the Fresno to Bakersfield Section of the HST System will have no effect to species regulated by NMFS and protected under the ESA.

Block 10a: USFWS Biological Opinion

In its BO issued to the Authority in February 2013, USFWS concluded that construction, operation, and maintenance of the Fresno to Bakersfield Section is unlikely to jeopardize the continued existence of endangered San Joaquin kit fox (*Vulpes macrotis mutica*), the Tipton kangaroo rat (*Dipodomys nitratoides nitratoides*), the blunt-nosed leopard lizard, the vernal pool tadpole shrimp and its critical habitat (*Lepidurus packardi*), the California jewel flower (*Caulanthus californicus*), the Kern mallow (*Eremalche kernensis*), the San Joaquin woolly threads (*Monolopia congdonii*), the central California Distinct Population Segment of the California tiger salamander (*Ambystoma californiense*), the vernal pool fairy shrimp and its critical habitat (*Branchinecta lynchi*), the Valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*), and the Hoover's spurge (*Chamaesyce hooveri*). The same BO concluded that construction, operation, and maintenance of the Fresno to Bakersfield Section are likely to adversely affect these same species. Conservation measures and binding, nondiscretionary terms and conditions included within the USFWS BO must be implemented to avoid or minimize the impacts of anticipated incidental take of these resources. These measures, terms, and conditions are included in the USFWS BO, a copy of which is available under Other Requisite Material on the CD-ROM provided with this 401 application package. An amendment of the BO is tentatively expected to be received by the Authority in spring 2014.

Block 10b: CDFW Incidental Take Permit

Because implementing PP1 might result in take of a state-listed species under the California ESA, the Authority is requesting an Incidental Take Permit under Section 2081(b) of the California ESA for the following state-listed species:

- California tiger salamander (*Ambystoma californiense*): State-listed as threatened.
- Swainson's hawk (*Buteo swainsoni*): State-listed as threatened.
- Nelson's (San Joaquin) antelope squirrel (*Ammospermophilus nelsoni*): State-listed as threatened.
- Tipton kangaroo rat (*Dipodomys nitratoides nitratoides*): State-listed as endangered
- San Joaquin kit fox (*Vulpes macrotis mutica*): State-listed as threatened.

The potential for state-listed species to occur in the project vicinity was initially assessed in the EIR/EIS for the Fresno to Bakersfield Section (Authority and FRA 2014). The potential for occurrence was determined based on the habitats present in the biological study area; documented occurrences in the California Natural Diversity Database for state-listed species in the vicinity of the PP1 study area; and, where possible, habitat assessments and biological surveys conducted as part of the project. Based on the determination of whether a state-listed species may occur in the vicinity of PP1, an assessment was made as to whether the species in question could potentially be subject to take as defined under the California ESA. A draft

Incidental Take Permit application was submitted to CDFW in August 2012 and comments were received. A final 2081 Incidental Take Permit application is expected to be submitted to CDFW in February 2014 and a permit issued by CDFW is anticipated by October 2014. For additional information on the likelihood of state-listed species to occur within or near PP1, see the Biological Assessment for the Fresno to Bakersfield Section of the HST project, and the biological resources section of the Fresno to Bakersfield EIR/EIS. For federally listed species, see the USFWS issued BO and NMFS No Effect Detmination letter, which are provided on the enclosed CD-ROM in the Other Requisite Material.

Section 9
Other Actions and Best Management Practices

Section 9 Block 11: Other Actions and Best Management Practices

A number of actions and measures have been and/or are proposed to be implemented as part of the project to avoid and minimize effects to water features, wetlands, other waters and associated biological resources. Avoidance and minimization measures include those which have been or are proposed to be implemented as part of the design process, prior to site preparation, and/or during construction. Approaches and measures to avoid and minimize impacts on biological resources, including those associated with water features, wetlands and other waters, were incorporated into the alignment selection during the preliminary design stages. Additional avoidance measures are described in Sections 3 and 5 of the Checkpoint C Summary Report (Authority and FRA 2013a). Further refinements and procedures that may be identified during final design and construction may further avoid and minimize impacts on natural resources.

Avoidance and Minimization

The design standards for tracks that can accommodate an HST traveling at 220 mph (design speed) allow little flexibility to create curves that avoid certain resources (the curve radius is a minimum of approximately 5 miles). However, during preparation of the EIR/EIS and development of Checkpoint C Summary Report considerations were given to design alternatives that would avoid and minimize impacts on the aquatic environment. As discussed in Sections 3 and 5 of the Checkpoint C Summary Report (Authority and FRA 2013a), while significant effort has been made to produce a preliminary design that avoids and/or limits impacts on water features, wetlands, and other waters, the actual configuration of the various crossings will not be known until a D/B team is determined and has prepared its first design submittal. Avoidance and minimization measures developed through the environmental review process and in coordination with regulatory agencies (e.g., USACE, EPA) are discussed below. The Authority and FRA will coordinate with resource agencies to provide cross-sectional and profile data of the proposed crossings as further refinement of the planning and design process as appropriate.

Avoidance Measures

As identified in Sections 3 and 5 of the Checkpoint C Summary Report (Authority and FRA 2013a), the Authority and FRA established a project objective to route tracks adjacent to existing transportation corridors to the extent practicable to minimize community disruption and environmental impacts pursuant to Streets & Highways Code Section 2407.09(g). While this objective cannot always be met, in general the introduction of new greenfield alternatives has been avoided. Staying near existing transportation corridors consolidates transportation facilities and associated effects such as noise and visual effects from transportation infrastructure. Additionally, the Authority has considered a range of alternatives so that the various impacts can be compared and balanced to identify the Preferred Alternative.

Minimization Measures

Where impacts on water features, wetlands, and other waters could not be avoided, temporary and permanent impacts on aquatic resources will be minimized to the extent feasible, while meeting the primary need to construct and operate the HST safely. To minimize permanent impacts on water features, wetlands, and other waters, spans will be designed to minimize the number of support piers and bents. Other BMPs will be implemented to minimize sedimentation and in-water impacts on water quality during construction, as described below. Additional measures will also be identified in the project SWPPP and post-construction water quality management plan to be prepared by the D/B contractor in accordance with the Construction General Permit standards and requirements and the Caltrans Permit standards and requirements,

respectively (see also Attachment 3, Post-Construction Stormwater Quality Standards and Water Quality Technical Report; also referred to as the "Technical Memorandum").

Construction and Post-Construction BMPs

The MMRP (Authority and FRA 2013b) will form the framework and responsibilities to be assigned to the D/B contractor, construction manager, and the Authority. The mitigation responsibilities will be represented in the D/B contract bid documents. The pre-construction surveys itemized in these documents, such as for plant and wildlife, will provide the basis for establishing ESAs, ERAs, and exclusion fencing to minimize or avoid biological impacts, including impacts on water features, wetlands, and other waters. The contractor will be responsible for establishing the ESAs and ERAs under the supervision of the Project Biologist and consistent with the permits and design. By incorporating provisions such as these, the avoidance and minimization measures will be identified, assigned, monitored, and reported on. A number of BMPs will be implemented during the construction and post-construction phases of the HST project. Measures to be implemented as part of the HST project (for example, avoidance periods associated with sensitive biological resources life stages would be incorporated as part of the overall project schedule).

These BMPs may also be considered for inclusion in the project SWPPP, in the USFWS Biological Resources Management Plan, and in post-development water quality technical reports. The BMPs identified below are not comprehensive or final, but are examples of BMPs that can be used to comply with the standards of the Construction General Permit and the Caltrans permit. These BMPs are subject to change, including the addition of BMPs and/or the replacement of BMPs, when the D/B contractor prepares the project SWPPP and the post-development water quality management plan. The strategy used for implementing construction site BMPs depends, in part, on project site conditions and anticipated construction operations. While the recommendations below are suitable for construction operations for the HST project, the construction contractor will ultimately be responsible for compliance with the Construction General Permit. Therefore, the construction contractor will have the responsibility and discretion to implement whatever combination of BMPs is needed to meet Construction General Permit requirements.

The Authority is also presently obtaining post-development coverage under CWA Section 402 for HST facilities. This process is expected to take substantial time, including completion of internal review by the Authority and the SWRCB. Section 402 NDPES permit coverage authorizing discharges during project operations must be in place at the time that the first Notice of Termination is filed under the Construction General Permit. It is currently anticipated that a statewide Section 402 General NPDES Permit for post-development discharges of stormwater will ultimately be issued for the California HST System with terms and conditions substantially similar to those set forth in Attachment 3 to this 401 permit application.

Source information for the construction phase and post-construction phase BMPs listed below include:

- USFWS BO (USFWS 2013).
- Fresno to Bakersfield EIR/EIS (Biological Resources, Geology Soils and Seismicity, Hydrology Water Resources sections (Authority and FRA 2014); mitigation measures identified by "MM" nomenclature below.
- Caltrans Construction Site BMPs Manual (Caltrans 2003a).
- MMRP (Authority and FRA 2013b).

Construction Phase Best Management Practices

Construction-phase BMPs will be implemented to minimize construction-related water quality impacts, pursuant to the standards and requirements of the Construction General Permit, and will

provide an effective combination of erosion and sediment controls. The selection of BMPs will depend on site characteristics and anticipated weather conditions at the project site. Implementation of these BMPs will be based on site-specific requirements as determined by the Qualified SWPPP Developer and/or Qualified SWPPP Practitioner. The Construction SWPPP will include measures to address erosion and sediment control BMPs, source control BMPs, non-stormwater management, and post-construction BMPs. BMPs to be implemented, as appropriate, are summarized below. Guidance for deployment and maintenance of these construction site BMPs is presented in applicable California Stormwater BMP fact sheets. In addition, requirements for construction BMPs to minimize or avoid impacts on biological resources are contained in the EIR/EIS.

General

The Authority will avoid or minimize potential construction-related water quality impacts through compliance with the Construction General Permit. The Authority will be responsible for filing a Notice of Intent with the SWRCB and the contractor will prepare a SWPPP, developed by a qualified SWPPP practitioner, and implement an appropriate suite of temporary construction BMPs.

Biological Resources

Where impacts could not be avoided through design measures, the following measures have been identified to minimize impacts on wildlife functions associated with water features, wetlands, and other waters (the source of each measure is identified in parentheses):

1. Construction equipment will be washed before entering and leaving the work area (USFWS BO Conservation Measure #16).

2. Prior to ground-disturbing activities, the contractor will locate staging areas for construction equipment outside sensitive biological resources, including habitat for special-status species, habitats of concern (e.g. water features, wetlands, and other waters, including riparian communities), and wildlife movement corridors, to the maximum extent possible. The contractor will submit a memorandum to the Authority documenting compliance (Bio-MM #9).

3. As much as is practicable, construction staging will use the same areas that will ultimately be occupied by permanent HST facilities (USFWS BO Conservation Measure #14).

4. Fencing will be placed to establish non-disturbance exclusion zones to restrict construction equipment and personnel from entering environmentally sensitive areas or restrict wildlife species from entering construction areas (USFWS BO Conservation Measure #10).

5. ESAs and ERAs will be delineated on plans and in the field.

    a. Prior to ground-disturbing activities, to the extent practicable, the contractor will verify that ESAs and ERAs are delineated as appropriate. ESAs are areas within the construction zones containing suitable habitat for special-status species and habitats of concern that may allow construction activities, but have restrictions based on the presence of special-status species or habitats of concern at the time of construction. ERAs are areas outside the construction footprint that must be protected in-place during all construction activities.

    b. Prior to ground-disturbing activities, the contractor will include all ESAs and ERAs on final construction plans (including grading and landscape plans); prepare, review, and

approve the map of all ESAs and ERAs on the design drawings; and work to update the map as necessary.

c. Prior to ground-disturbing activities, the contractor will mark ESAs and ERAs with high-visibility temporary fencing to prevent encroachment of construction personnel and equipment onto sensitive areas. Designate the two categories, ESA and ERA, differently in the field (e.g., different colored flagging/fencing). Use sub-meter accurate global positioning system equipment to delineate all ESAs and ERAs. Remove ESA and ERA fencing when construction is complete or the resource has been cleared according to agency permit conditions and construction drawings and specifications. The contractor will submit memoranda regarding the field delineation of all ESAs/ERAs to the Authority. These areas will receive ongoing monitoring during site preparation and construction activities (Bio-MM #7).

6. For seasonal avoidance of special-status vernal pool branchiopods and vernal pool-dependent species (e.g., California tiger salamander), work will not be conducted within 250 feet of aquatic habitats suitable for these species (e.g., vernal pools and other seasonal wetlands) from October 15 to June 1 (corresponding to the rainy season), or as determined through informal or formal consultation with the USFWS or USACE. Ground-disturbing activities may begin once the habitat is no longer inundated for the season. If any work remains to be completed after October 15, exclusion fencing and erosion control measures will be placed as a buffer between ground-disturbing activities and the vernal pools and other seasonal wetlands, as determined through consultations with the USFWS or USACE (Bio-MM #19).

7. During ground-disturbing activities, the contractor will conduct monitoring within water features, wetlands and other waters, including monitoring of the installation of protective devices (silt fencing, sandbags, fencing, etc., as specified by the SWPPP), installation and/or removal of creek crossing fill, construction of access roads, vegetation removal, and other associated construction activities. The contractor will conduct biological monitoring to document adherence to habitat avoidance and minimization measures addressed in the project mitigation measures and as listed in the Section 401 certification, USFWS, CDFW, and USACE permits conditions. The contractor will report and document compliance consistent with requirements in the permitting documents, including frequency and timing and submittals (Bio-MM #49).

8. During construction, work window restrictions will be implemented during which certain activities such as initial site preparation will be phased to minimize effects on resources. For example, scheduling construction activities in consideration of the breeding season at or near a stream crossing that includes riparian vegetation with breeding bird habitat could avoid impacts on breeding species. These areas will be fenced as ESAs. Pre-construction surveys will be completed to determine the presence of species prior to site preparation to determine the need for avoidance or minimization of effects to the species. This is particularly relevant for breeding bird habitat and for California tiger salamander because considerable breeding habitat exists for these species. Construction would be phased, as described in the construction work window restriction item above, or timed to allow the surveys to proceed without the need for relocation (MMRP Bio-MM #19 and 29 and 30).

9. Areas that have native riparian or wetland vegetation may be restored in the temporary impact areas as dictated by site and project constraints where aligned with key riparian or wetland features. Prior to construction, cuttings, duff, and other genetic or biomass materials may be salvaged to assist the re-establishment of the landscape (MMRP Bio-MM #15 and 44).

10. Project area vehicle speed limits will be integrated into the construction operation to minimize dust, erosion, noise, and startle effects during the site preparation and construction periods (Bio-MM #11 and MMRP Bio-MM#10).

11. Remnant parcel areas will be utilized, when available, as staging or laydown areas during construction, thus minimizing and avoiding impacts on more sensitive areas elsewhere. Pre-construction surveys will be carried out to determine that the remnant areas do not support sensitive resources and that the remnant areas could be excluded from use during construction (Checkpoint C Bio-MM #9).

Erosion and Sediment Control Best Management Practices

1. Standard construction practices, including BMP naming conventions, such as those listed in Caltrans' Construction Site BMPs Manual (Caltrans 2003a) and Caltrans' Construction Site BMP Field Manual and Troubleshooting Guide (Caltrans 2003b), will be followed in order to reduce the potential for erosion.

2. Effective soil cover will be provided for inactive construction areas (i.e., areas of construction activities that have been disturbed and are not scheduled to be redisturbed for at least 14 days) (Bio-MM # 49).

3. Construction activities will be conducted to the extent possible during periods when rain is not predicted, in order to minimize the probability that disturbed soils will be exposed to rain. Disturbed soils will be stabilized as soon as practical after completion of construction (Caltrans SS-1, SS-3, SS-4, SS-5, SS-6, SS-7, and SS-8).

4. Existing vegetation will be left undisturbed as long as possible; construction scheduling will be employed to ensure land disturbance is conducted only when needed in the construction sequence. Vegetation that can be preserved will be identified and flagged or fenced to avoid disturbance (Caltrans SS-1, SS-2).

5. Where feasible, areas that may have substantial erosion risk will be avoided, including areas with erosive soils and steep slopes. Grading activities will be performed in such as manner as to not produce direct routes for conveying runoff to drainage channels (Bio-MM #49).

6. Measures will be implemented to reduce erosion of exposed soil; such measures may include soil stabilization, watering for dust control, installation of perimeter silt fences, placement of fiber rolls, and construction of sediment basins (Caltrans SC-1, SC-5).

7. Temporary concentrated flow management systems, such as berms, ditches, and outlet-flow-velocity-dissipation devices to reduce sediment transport from newly disturbed sites will be implemented (Checkpoint C Bio-MM#49).

8. Erosion control materials will not include plastic monofilament netting (erosion-control matting) or similar materials (USFWS BO Conservation Measure #11 and Bio-MM #10).

9. During ground-disturbing activities, the contractor will restrict project-related vehicle traffic, within the construction area, to established roads, construction areas, and other designated areas. Established vehicle traffic locations disturbed by previous activities would prevent further adverse effects. A 15 mph speed limit for construction areas would be observed within potential special-status species habitat. Access routes would be clearly flagged and marked and off-road traffic would be prohibited. The contractor will submit a memorandum to the Authority documenting compliance on a weekly basis (Bio-MM #11, USFWS BO Conservation Measure #18).

10. Diversion drains or gravel bag berms will be installed, as appropriate, to intercept stormwater runoff and direct it around the construction work area (Caltrans SS-9).

11. Sediment controls, such as gravel bag berms, fiber rolls, or silt fence, will be placed at the base of soil stockpiles in order to prevent discharge of sediment-laden runoff. Stockpiles will be covered when rain is predicted, and dust control BMPs will be implemented to control wind erosion. Stockpiles will be sited away from drainages and storm drain inlets (Caltrans SS-7, WE-1, WM-3).

12. Storm drain inlets in proximity to construction activities will be protected by use of drop inlet filter fabrics, gravel bags, and/or fiber rolls. Inlet protections must not cause flooding of roadways (Caltrans SC-10).

13. Construction site entrances will be stabilized, inspected regularly, and any trackout promptly managed with street sweeping or vacuuming (Caltrans TC-1, SC-7).

14. In order to minimize dust production, a speed limit of 20 mph will be enforced in temporary and permanent construction areas (USFWS BO Conservation Measure #18).

15. Disturbed slopes and stream banks will be protected from wind and water erosion with tackifier or hydraulic mulch (Caltrans SS-3, SS-4, SS-5, SS-6, and SS-12).

16. Immediately following construction, disturbed soils will be stabilized, as appropriate. Revegetation will be conducted in accordance with the project's Restoration and Revegetation Plan (Caltrans SS-3, SS-4, SS-5, SS-6, SS-7, and SS-8).

Non-Stormwater Management and Source Controls

1. Construction materials, equipment, and maintenance supplies will be managed such that contact with stormwater is minimized. Materials storage will be sited near the construction entrance and away from drainages (Caltrans WM-1, WM-2).

2. Temporary storage of excavated materials produced by construction activities will be in designated areas at or near the construction site. Where possible, excavated soil will be returned to its original location to be used as backfill (USFWS BO Conservation Measure #15).

3. Construction waste materials will be disposed of in local landfills permitted to accept those types of materials. Material unsuitable for reuse will be hauled offsite to a permitted location (USFWS BO Conservation Measure #15).

4. A spill prevention and emergency response plan will be developed for potential fuel or other spills (Caltrans WM-4).

5. Storage, handling, transportation, and disposal of hazardous waste materials will comply with applicable federal, state, and local laws; and will be in accordance with the applicable BMP Fact Sheet (Caltrans WM-6).

6. Concrete wash water will be managed to ensure it is not discharged from the construction site. Measures will be implemented to capture and dispose of concrete wash water properly, including isolation of runoff from fresh concrete during curing to prevent it from reaching the local drainage system, and possibly treatment with dry ice or other acceptable means to reduce the alkaline character of the runoff (high pH) that typically results from new concrete (Caltrans WM-8).

7. Trash and construction debris will be placed in appropriate waste collection containers, which will be emptied regularly. Good housekeeping practices will be observed (Caltrans WM-5).
8. Sanitary facilities will be sited at least 50 feet away from drainages, environmentally sensitive areas, and watercourses (Caltrans WM-9).
9. Construction groundwater may be encountered in excavations and require dewatering. Any discharge of construction dewater will be in accordance with applicable permits and applicable BMP Fact Sheet (Caltrans NS-2).
10. For construction in or near streams with flowing water, clear water diversions will be used, where appropriate, to control turbidity (Caltrans NS-5). Any diversion of water necessary for project implementation will require the contractor to prepare a water diversion plan that complies with all regulatory permits and agreements. Dewatering permits include Central Valley RWQCB, Order No. R5-2013-0074, Waste Discharge Requirements for Dewatering and Other Low Threat Discharges to Surface Waters and SWRCB Water Quality Order No. 2003-003-DWQ, Statewide General Waste Discharge Requirements for Discharges to Land with a Low Threat to Water Quality (USFWS BO Conservation Measure #17).
11. A biological monitor will be present prior to construction in streams with flowing water (BIO-MM#49).
12. Contractor will not conduct work within 250 feet of an avoided seasonal wetland or vernal pool from October 15 to June 1, unless exclusion fencing and erosion control measures are installed and monitoring is conducted (BIO-MM#19).
13. Where construction involves local road improvements, measures to control non-stormwater discharges associated with paving and grinding operations will be implemented (Caltrans NS-3).
14. If construction requires temporary stream crossings to accommodate construction equipment, measures will be implemented to prevent water quality impacts on the affected stream (Caltrans NS-4).

Post-Construction Phase Best Management Practices

Stormwater quality standards have been developed in consultation with the SWRCB and for implementation of post-construction stormwater quality design measures for the Fresno to Bakersfield Section PP1 which are expected to be incorporated into the Section 401 permit. This approach represents the consensus of a technical working group composed of the Authority, their regional consultants, and the SWRCB. The SWRCB has determined that implementation of post-construction treatment and hydromodification control BMPs, in compliance with the Caltrans permit post-construction standards and requirements, meets or exceeds compliance with the requirements of Section XIII of the Construction General Permit.

Implementation of permanent post-construction BMPs will minimize potential water quality impacts associated with runoff from HST facilities. The contractor will be responsible for constructing permanent post-construction stormwater BMPs in accordance with Authority standards. The post-construction BMPs and the SWPPP requirements will meet post-development hydromodification control standards to minimize adverse effects such as offsite erosion, sedimentation, and water quality impairments. The Authority will be responsible for long-term inspection and maintenance of the permanent BMPs within its jurisdictional right-of-way to ensure that the BMPs are maintained in good working order.

Post-construction BMPs include the following:

1. Prioritized implementation of Low Impact Development Treatment BMPs such as infiltration basins and trenches, harvest and reuse BMPs, biofiltration swales and strips, media filters, and detention basins to minimize water quality impacts associated with the operation and maintenance of the HST System will protect water quality and channel stability in receiving waters.

2. Post-construction compliance reports will be prepared and submitted consistent with regulatory permits (BIO-MM#15; USFWS BO Conservation Measure #20).

3. The D/B contractor is also responsible for preparing a post-development water quality management plan.

Section 10
Past and Future Proposals by the Applicant

Section 10 Block 12: Past and Future Proposals by the Applicant

PP1 of the Fresno to Bakersfield Section is the first permitting package for the Fresno to Bakersfield section in a multiphase HST project.

Future Projects

The Applicant has not carried out projects in the past 5 years. Projects planned for implementation by the Applicant in the next 5 years are described below. These projects will largely affect different receiving waters and thus do not have a cumulative effect on the waters affected by this project.

The PP1 of the HST Fresno to Bakersfield Section is part of a larger, statewide HST project. The final statewide HST project will consist of at least nine separate phases, each of which can function independently, but which, joined together, will create the larger, statewide system.

Other section phases that are expected to begin construction in the next 5 years include the Merced to Fresno section, with first year of operation planned for 2018; and the Bakersfield to Palmdale, Palmdale to Los Angeles, and San Jose to Merced sections, with first year of operation planned for 2022. As with PP1, construction of other sections of the HST System will begin only after completion of full environmental review and compliance with CEQA/NEPA, as well as state and federal permitting requirements. Impacts for future construction would be similar to those of PP1. Each of the remaining HST sections contains waters of the United States and/or waters of the State, which would likely receive discharges of dredged or fill material during construction of the HST project features. Like PP1, waters of the United States and waters of the State would be avoided during construction and operation of future HST sections to the maximum extent feasible. Unavoidable impacts will be minimized and compensatory mitigation will be provided.

This page intentionally left blank

Section 11
References

Section 11 References

California High-Speed Rail Authority and USDOT Federal Railroad Administration (Authority and FRA). 2005. Final Program Environmental Impact Report/Environmental Impact Statement (EIR/EIS) for the Proposed California High-Speed Train System. Vol. 1,Report. Sacramento and Washington, D.C.: California High-Speed Rail Authority and USDOT Federal Railroad Administration.

_____. 2008.Final Program Environmental Impact Report/Environmental Impact Statement (EIR/EIS) for the proposed Bay Area to Central Valley HST Program. Vol. 1,Report. Sacramento and Washington, D.C.: California High-Speed Rail Authority and USDOT Federal Railroad Administration.

———. 2011a. Section 106 Programmatic Agreement among the Federal Railroad Administration, the Advisory Council on Historical Preservation, the California State Historic Preservation Officer, and the California High Speed Rail Authority Regarding Compliance with Section 106 of the National Historic Preservation Act. Sacramento, CA, and Washington, DC. June.

———. 2011b. California High-Speed Train Fresno to Bakersfield Archaeological Survey Report (ASR). Sacramento and Washington, D.C.

———. 2011c. California High-Speed Train Fresno to Bakersfield Historic Architectural Survey Report (HASR). Sacramento and Washington, D.C.

———. 2011d. California High-Speed Train Fresno to Bakersfield Historic Property Survey Report (HPSR).

———. 2011e. *Fresno to Bakersfield Preliminary Jurisdictional Waters and Wetlands Delineation Report.* Prepared by URS/HMM/Arup Joint Venture. Sacramento and Washington, DC: California High-Speed Rail Authority and USDOT Federal Railroad Administration, July 2011..

———. 2012a. California High-Speed Train Fresno to Bakersfield Supplemental Archaeological Survey Report (Supplemental ASR). Sacramento and Washington, D.C.:

_____. 2012b.California High-Speed Train Fresno to Bakersfield Supplemental Historic Architectural Survey Report (Supplemental HASR). Sacramento and Washington, D.C.:

_____. 2012c.California High-Speed Train Fresno to Bakersfield Supplemental Historic Property Survey Report (Supplemental HPSR). Sacramento and Washington, D.C.:

_____. 2013a. Fresno to Bakersfield Section Checkpoint C Summary Report, California High-Speed Train Project. Sacramento, CA, and Washington, DC. November

———. 2013b. California High-Speed Train Fresno to Bakersfield Mitigation Monitoring and Reporting Program. Sacramento, CA, and Washington, DC.

———.2013c. California High-Speed Train Fresno to Bakersfield Second Supplemental Historic Architectural Survey Report (Second Supplemental HASR). Sacramento, CA, and Washington, DC.

———. 2013d. California High-Speed Train Fresno to Bakersfield Second Supplemental Historic Property Survey Report (Second Supplemental HPSR). Sacramento, CA, and Washington, DC.

———. 2013e. Fresno to Bakersfield Section Watershed Evaluation Report, California High-Speed Train Project. Sacramento, CA, and Washington, DC. May.

———. 2013f. Fresno to Bakersfield Section: *Evaluation of Wetland Condition Using the California Rapid Assessment Method*. Prepared by URS/HMM/Arup Joint Venture. Sacramento, CA, and Washington, DC: Authority and FRA. April 2013..

——— 2014. Final Environmental Impact Report/ Environmental Impact Statement (EIR/EIS) for the Fresno to Bakersfield Section of the California High-Speed Train (HST) Project. Sacramento, CA, and Washington, DC. (In progress)

California Stormwater Quality Association. 2009. Stormwater Best Management Practice Handbook, New Development and Redevelopment. January 2003, updated September 30, 2004.

California Department of Transportation (Caltrans). 2003a. Storm Water Quality Handbooks, Construction Site Best Management Practices (BMPs) Manual. Sacramento, CA. March 2003.

———. 2003b. Construction Site Best Management Practice (BMP) Field Manual and Troubleshooting Guide. Available at http://www.dot.ca.gov/hq/construc/stormwater/BMP_Field_Master_FullSize_Final-Jan03.pdf. Sacramento, CA. January 2003.

———. 2010. Storm Water Quality Handbooks, PPDG Project Planning and Design Guide. CTSW-RT-10-254.03. Office of Storm Water Management – Design. Sacramento, CA. July 2010.

Central Valley Regional Water Quality Control Board (CVRWQCB). 2004. Water Quality Control Plan for the Tulare Lake Basin. Second Edition. January 2004.

Department of Water Resources. 2009. California Water Plan Update (Water Plan).

Federal Highway Administration (FHWA). 2006. Assessing Stream Channel Stability at Bridges in Physiographic Regions -HRT-05-072

Federal Register. 2008. Federal Register Volume 73, No. 70. April 10, 2008. Rules and Regulations. Pages 19594-19705.

Navigant Consulting, Inc. 2008. The Use of Renewable Energy Sources to Provide Power to California's High Speed Rail. Prepared for the California High-Speed Rail Authority. Rancho Cordova, CA: Navigant Consulting, September 3, 2008.

State Water Resources Control Board (SWRCB). 2009. Order No. 2009-0009-DWQ as modified by Order No. 2010-0014-DWQ. Statewide NPDES General Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activities. Adopted September 2, 2009. Sacramento, CA.

State Water Resources Control Board (SWRCB). 2012. Order No. 2012-0011-DWQ,Caltrans Statewide Storm Water Permit. Adopted September 19, 2012. Sacramento, CA.

United States Army Corps of Engineers (USACE). 1996. Kaweah River Basin Investigation, California, Draft Environmental Impact Statement Report. June 1996.

———. 2004. *Mitigation and Monitoring Proposal Guidelines.* Special Public Notice, San Francisco and Sacrament Districts. December 30.

———. 2008. "Regulatory Guidance Letter No. 08-02: Subject: Jurisdictional Determinations." USACE, June 26, 2008. http://www.usace.army.mil/CECW/Documents/cecwo/reg/rgls/rgl08-02.pdf (accessed March 2010).

U.S. Army Corps of Engineers (USACE). 2012. 12501-SPD Regulatory Program Standard Operating Procedure for Determination of Mitigation Ratios, South Pacific Division. Available at http://www.spd.usace.army.mil/Missions/Regulatory/PublicNoticesandReferences.aspx. February 20, 2012 (revised August 6, 2012).

U.S. Army Corps of Engineers and U.S. Environmental Protection Agency (USACE and EPA). 2008. "Compensatory Mitigation for Losses of Aquatic Resources, Final Rule." *Federal Register*. Vol. 73, No. 70. April 10.

U.S. Fish and Wildlife Service (USFWS). 2013. *Biological Opinion on the California High Speed Train System: Fresno to Bakersfield Section Project, Fresno, Tulare, Kings, and Kern Counties*. USFWS, February 28, 2013.

This page intentionally left blank

Attachment 1

Fresno to Bakersfield Section
Project Description for the 401 Application

Table of Contents

Tables

Figures

Acronyms

ARRA	American Recovery and Reinvestment Act
ATC	automatic train control
Authority	California High-Speed Rail Authority
Caltrans	California Department of Transportation
CMP	Compensatory Mitigation Plan
CRM	collision response management
D/B	design/build
DEIR/DEIS	Draft Environmental Impact Report/Environmental Impact Statement
EIR/EIS	Environmental Impact Report/Environmental Impact Statement
EMU	electric multiple unit
FRA	Federal Railroad Administration
HMF	Heavy Maintenance Facility
HST	High-Speed Train
IOS	Initial Operating Section
OCS	overhead contact system
PCC	Portland Cement Concrete
PG&E	Pacific Gas and Electric Company
PP1	Permitting Phase 1
SR	State Route
TPSS	traction power substation
U.S.	United States

This page intentionally left blank

1.0 Introduction

The Authority is seeking agency approvals for the initial construction and operation of the Fresno to Bakersfield Section, referred to as Permitting Phase 1 (PP1). In the Fresno to Bakersfield Section, initial construction is planned to commence by fall 2014 and will include the area from Monterey Street in Fresno County to 7th Standard Road in Kern County.

The California High-Speed Rail Authority (Authority) proposes to construct, operate, and maintain an electric-powered high-speed train (HST) system in California. When completed, the nearly 800-mile train system would provide new passenger rail service to more than 90% of the state's population. The HST would be capable of operating speeds of up to 220 miles per hour (mph), with state-of-the-art safety, signaling, and automated train control systems. The system would connect and serve the major metropolitan areas of California, extending from San Francisco and Sacramento in the north to San Diego in the south (Figure 1-1). The Fresno to Bakersfield HST project section would connect a Fresno station, a Kings/Tulare Regional station in the Hanford/Visalia/Tulare area, and a Bakersfield station. The planned HST line north of the Fresno to Bakersfield Section would extend to Merced. A planned HST line west of the Merced to Fresno Section is through the Pacheco Pass, connecting the San Francisco to San Jose HST project to the Central Valley and the rest of the HST System. South of the Bakersfield Station, the HST line would continue to Los Angeles via Palmdale.

The Authority and Federal Railroad Administration (FRA) jointly prepared a full environmental analysis for the Fresno to Bakersfield Section, which is located in Fresno, Kings, Tulare, and Kern counties. The Authority and FRA circulated the Draft Environmental Impact Report/Environmental Impact Statement (DEIR/DEIS) for the Fresno to Bakersfield Section to affected local jurisdictions, state and federal agencies, tribes, community organizations, other interest groups, and interested individuals for 60 days from August 15 to October 13, 2011. The Authority and FRA circulated the Revised DEIR/Supplemental DEIS for the Fresno to Bakersfield Section to affected local jurisdictions, state and federal agencies, tribes, community organizations, other interest groups, and interested individuals for 60 days from July 20 to September 20, 2012, and then extended the comment period for an additional 30 days to October 19, 2012. The analysis evaluated the following 11 alternatives: the BNSF Alternative, Hanford West Bypass 1, Hanford West Bypass 1 Modified, Hanford West Bypass 2, Hanford West Bypass 2 Modified, Corcoran Elevated, Corcoran Bypass, Allensworth Bypass, Wasco-Shafter Bypass, Bakersfield South, and Bakersfield Hybrid alternatives.

The Authority will identify the Preferred Alternative in the Final Environmental Impact Report/Environmental Impact Statement (EIR/EIS). The Preferred Alternative extends from Downtown Fresno to Downtown Bakersfield and includes portions of the BNSF Alternative in combination with the Corcoran Bypass, Allensworth Bypass, and Bakersfield Hybrid alternatives (Figure 1-2). The Preferred Alternative for the Fresno to Bakersfield Section includes two stations: the Kings/Tulare Regional Station–East Alternative and the Bakersfield Station–Hybrid Alternative. The Mariposa site was selected for the Fresno station as part of the environmental review for the Merced to Fresno Section. The Fresno to Bakersfield Section EIR/EIS process did not include the selection of a heavy maintenance facility (HMF) site. No HMF is proposed for permitting in this application.

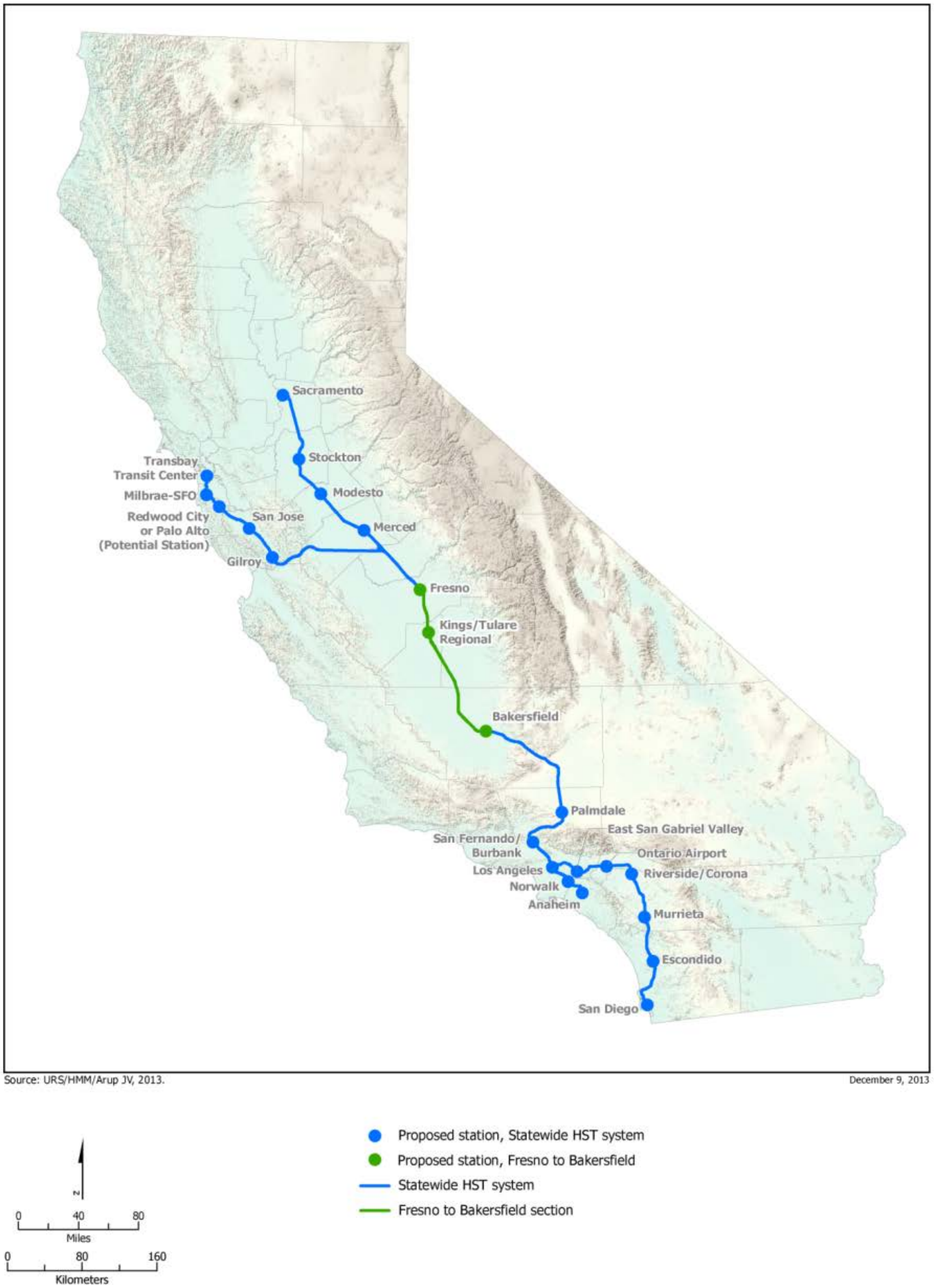


Figure 1-1
Statewide HST System

RFP No.: 13-57 – Addendum No. 5 - 10/09/2014

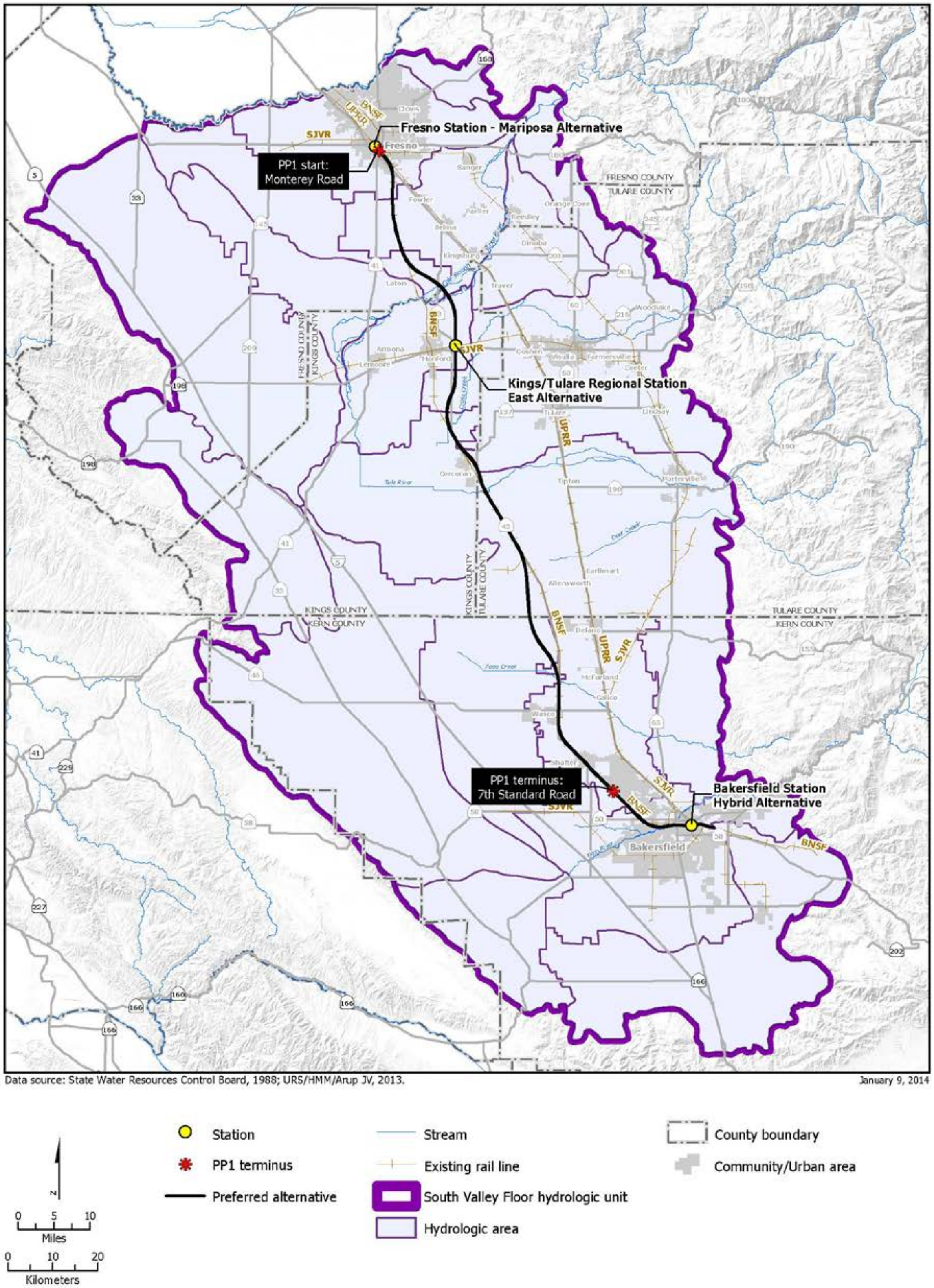


Figure 1-2
Permitting Phase 1 of the Fresno to Bakersfield Section

The Fresno to Bakersfield Section, including PP1, would be built using a design/build (D/B) approach, which is a method of project delivery where one entity works under a single contract with the project owner to provide design and construction services. The contract with the D/B contractor would require compliance with standard development practices and regulations, as well as implementation of any project design features and all applicable conservation measures, mitigation measures, and permit conditions. After selecting a D/B contractor for PP1, the Authority would start right-of-way acquisition and procure a separate construction management services contract to oversee physical construction of the project. Construction activities may occur at multiple points along PP1, depending on negotiations with property owners, agreements with utility owners, and status of environmental clearances. The first portions of PP1 are anticipated to start construction by fall 2014.

The project components of PP1 of the Fresno to Bakersfield Section include the HST track alignment, footprint, and project facilities. The alignment for PP1 starts at Monterey Street south of State Route (SR) 41 in Fresno County and ends at the intersection of 7th Standard Road and SR 43 in Kern County. PP1 includes only one of the stations discussed in the EIR/EIS—the Kings/Tulare Regional Station–East Station—and does not include the HMF. The Fresno Station would be permitted under the Merced to Fresno Section. The Bakersfield Station would be permitted under a different permitting phase. The HMF would be permitted after the selection of the HMF location. HMF alternatives are being evaluated as part of the San Jose to Merced, Merced to Fresno, and Fresno to Bakersfield sections.

The PP1 construction footprint includes the HST rights-of-way and associated project facilities (e.g., traction power substations) and the shifts in roadway rights-of-way associated with those facilities, including overcrossings and interchanges that would be modified to accommodate the HST project (Figure 1-3). Construction of PP1 of the Fresno to Bakersfield Section would include both permanent and temporary project components. Project components with permanent effects include the HST tracks; the Kings/Tulare Regional Station–East; traction power substations; interlocking sites; and maintenance of infrastructure, roadway overpasses and underpasses, access roads, radio sites, drainage basins, canal relocation areas, freight rail relocation areas, and BNSF yard relocation areas. Project components with temporary effects include temporary construction easements, track access easements, utility easements, utility relocation areas, natural gas line relocation areas, petroleum line relocation areas, transmission line relocation areas, water line relocation areas, temporary construction areas, and areas with base and surfacing removal. Impacts will be mitigated at various mitigation sites, as described in the Fresno to Bakersfield Section Compensatory Mitigation Plan (CMP).

Section 2.2, HST System Infrastructure, in the Fresno to Bakersfield EIR/EIS, provides a general description of HST project components. Section 2.4 of the Project EIR/EIS describes the Fresno to Bakersfield project alternatives (Authority 2014). These sections are summarized below.

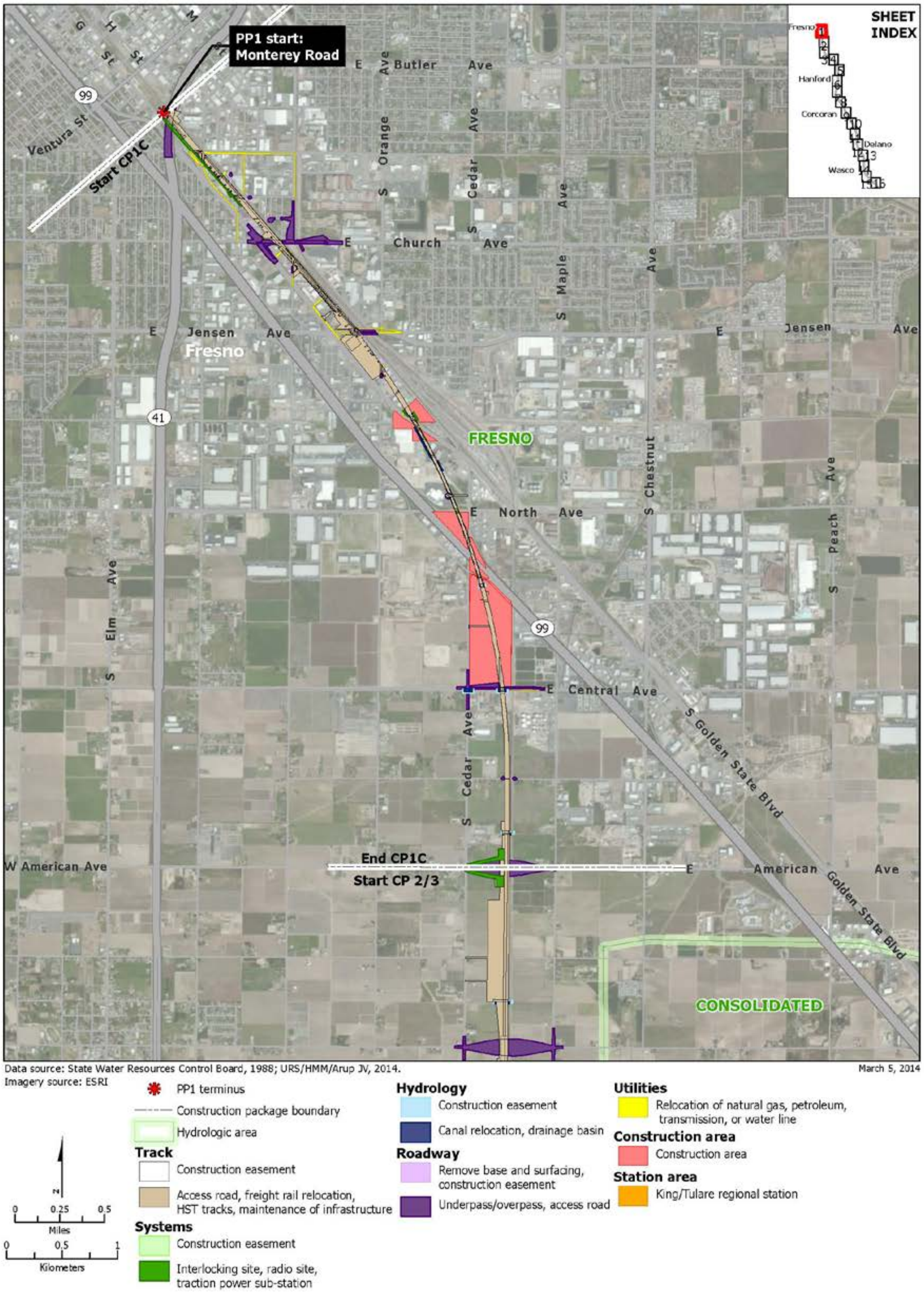


Figure 1-3
PP1 alignment construction elements
Sheet 1 of 16

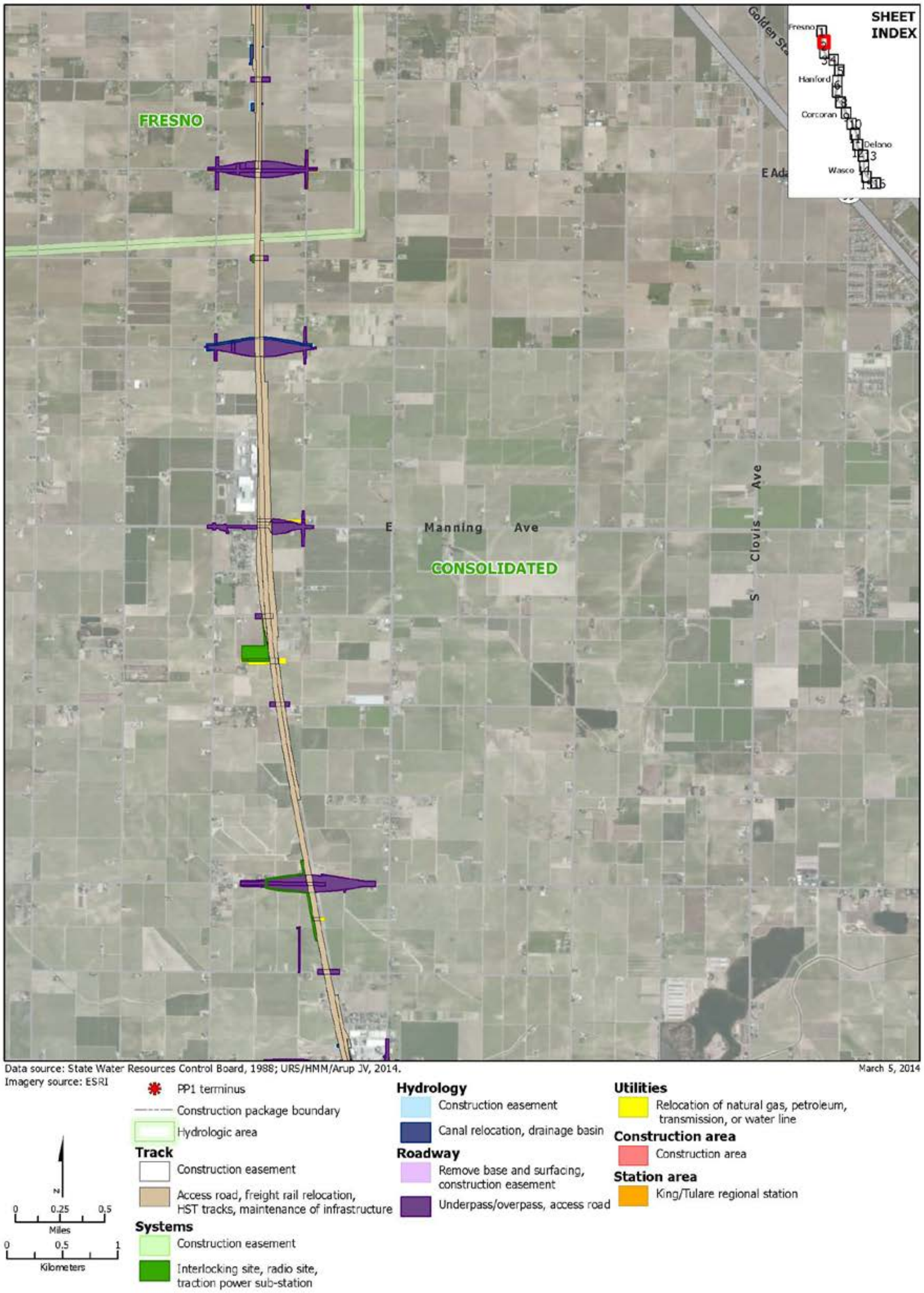


Figure 1-3
PP1 alignment construction elements
Sheet 2 of 16

RFP No.: 13-57 – Addendum No. 5 - 10/09/2014

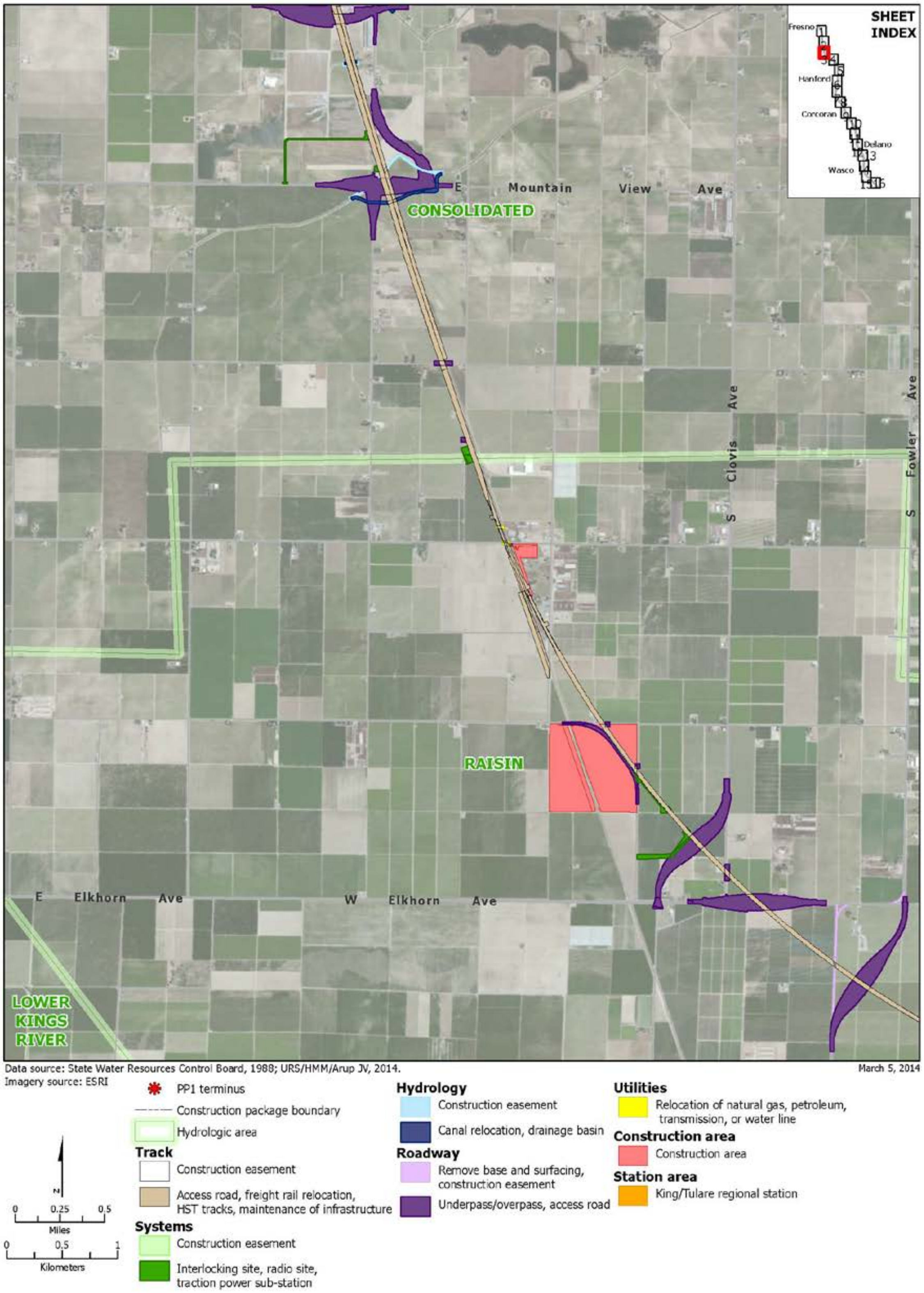


Figure 1-3
PP1 alignment construction elements
Sheet 3 of 16

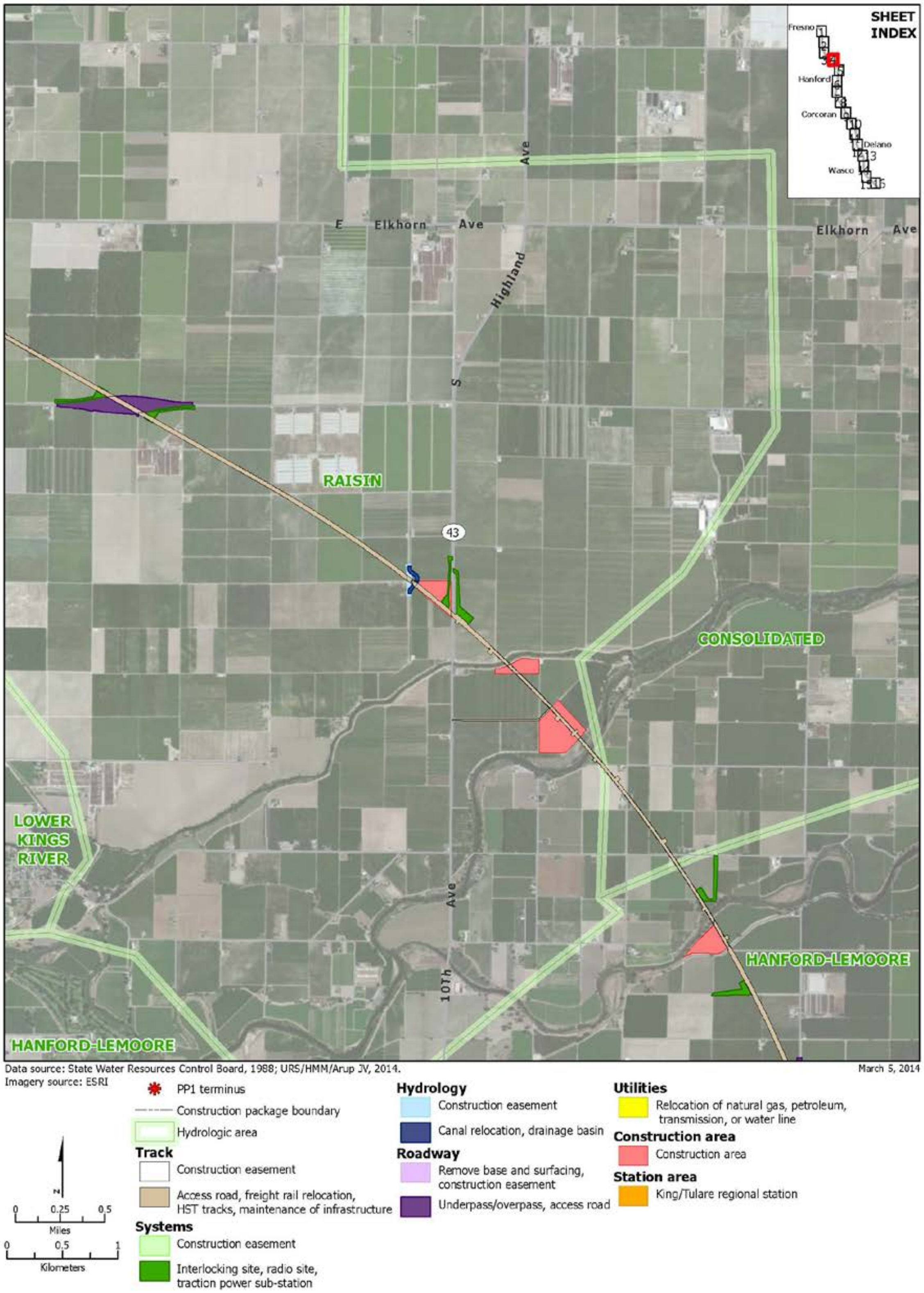


Figure 1-3
PP1 alignment construction elements
Sheet 4 of 16

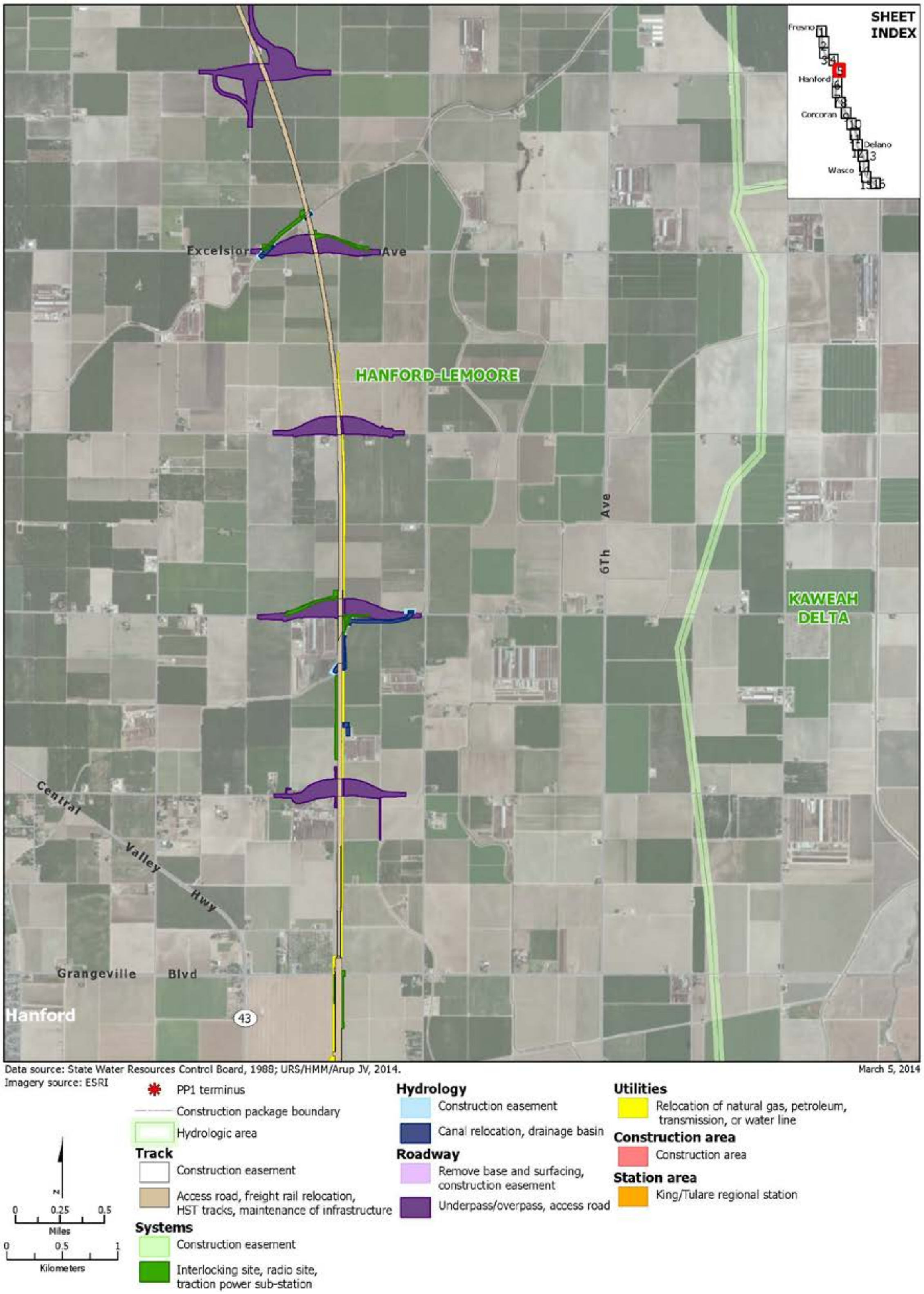


Figure 1-3
PP1 alignment construction elements
Sheet 5 of 16

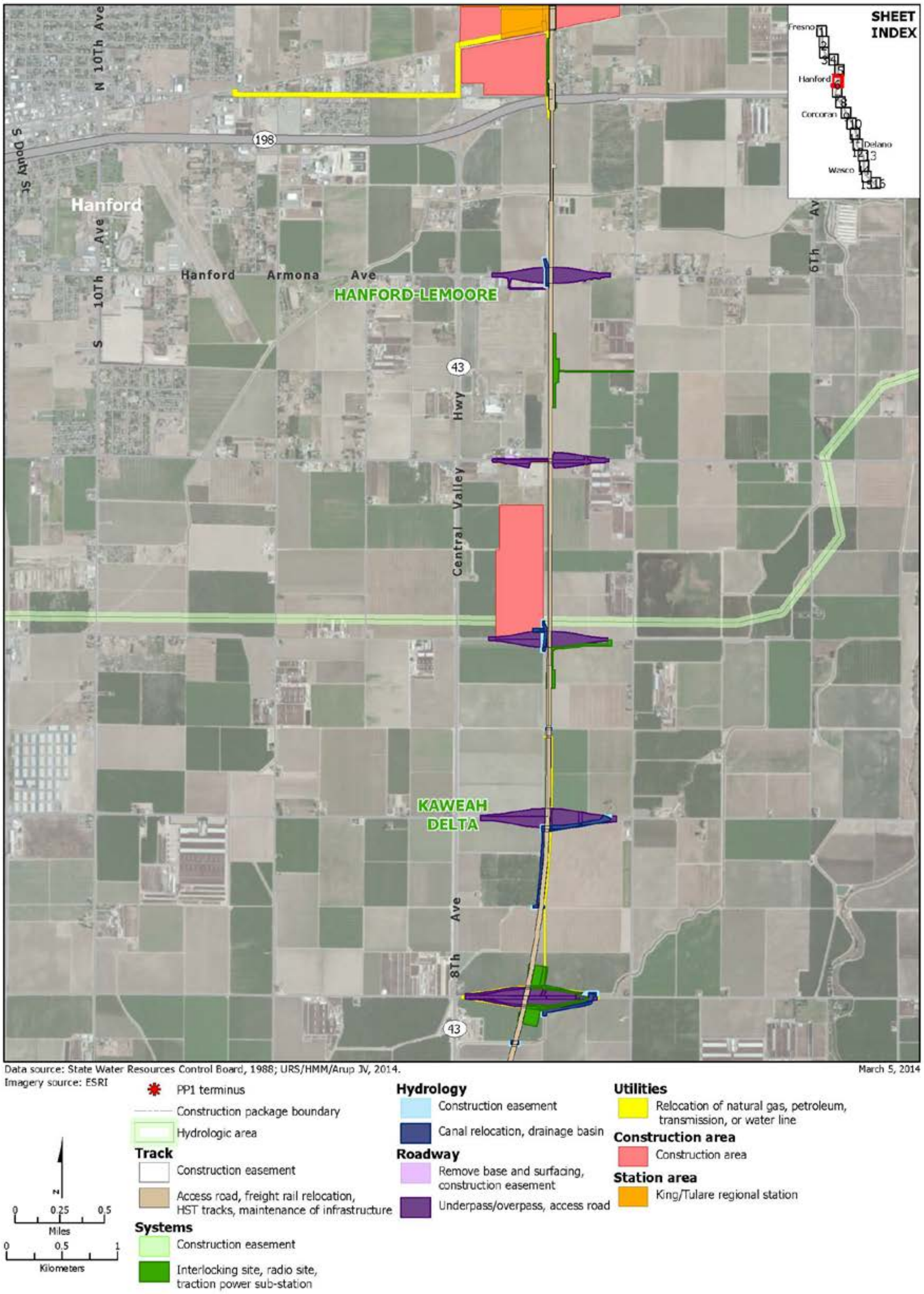


Figure 1-3
PP1 alignment construction elements
Sheet 6 of 16

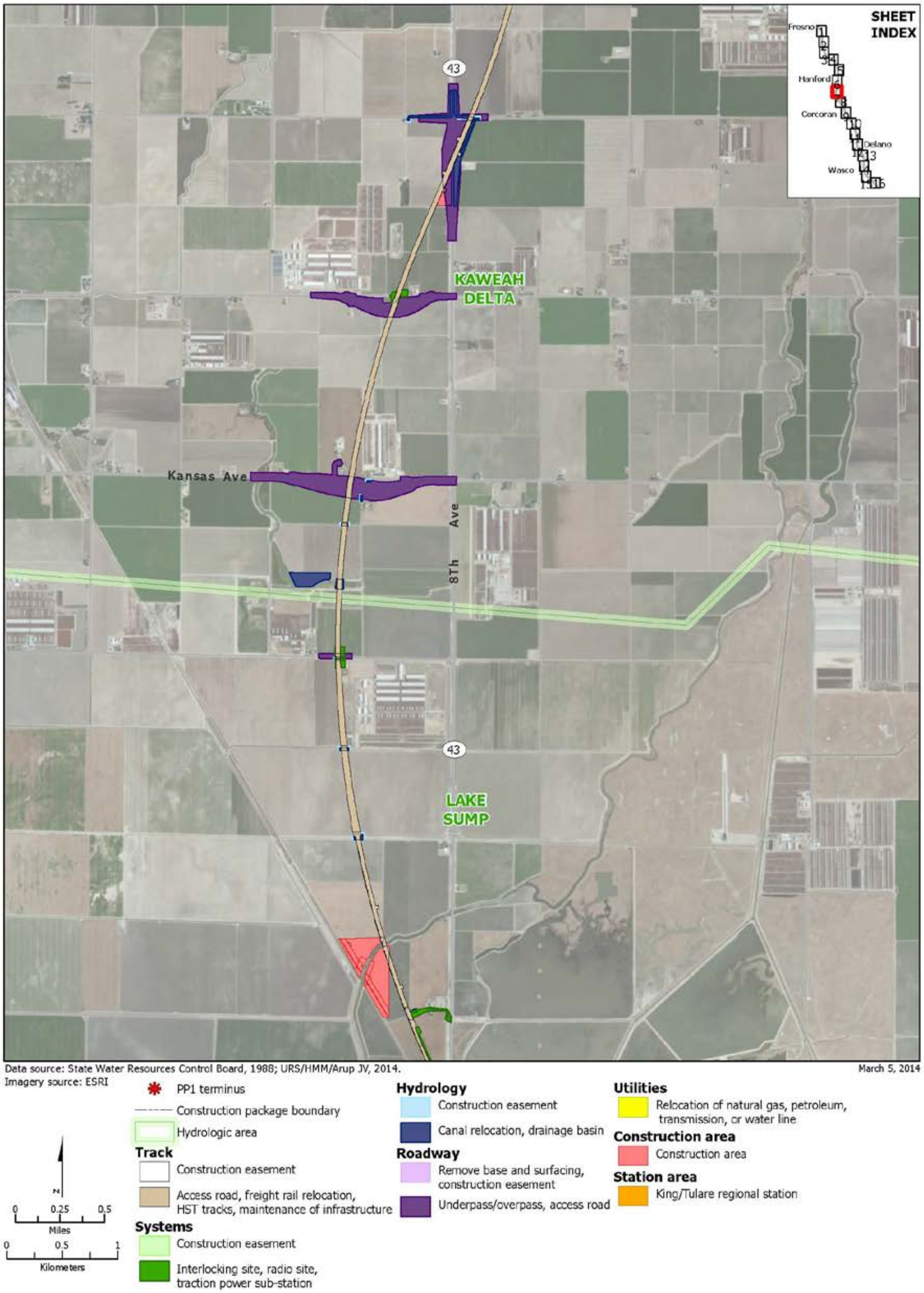


Figure 1-3
PP1 alignment construction elements
Sheet 7 of 16

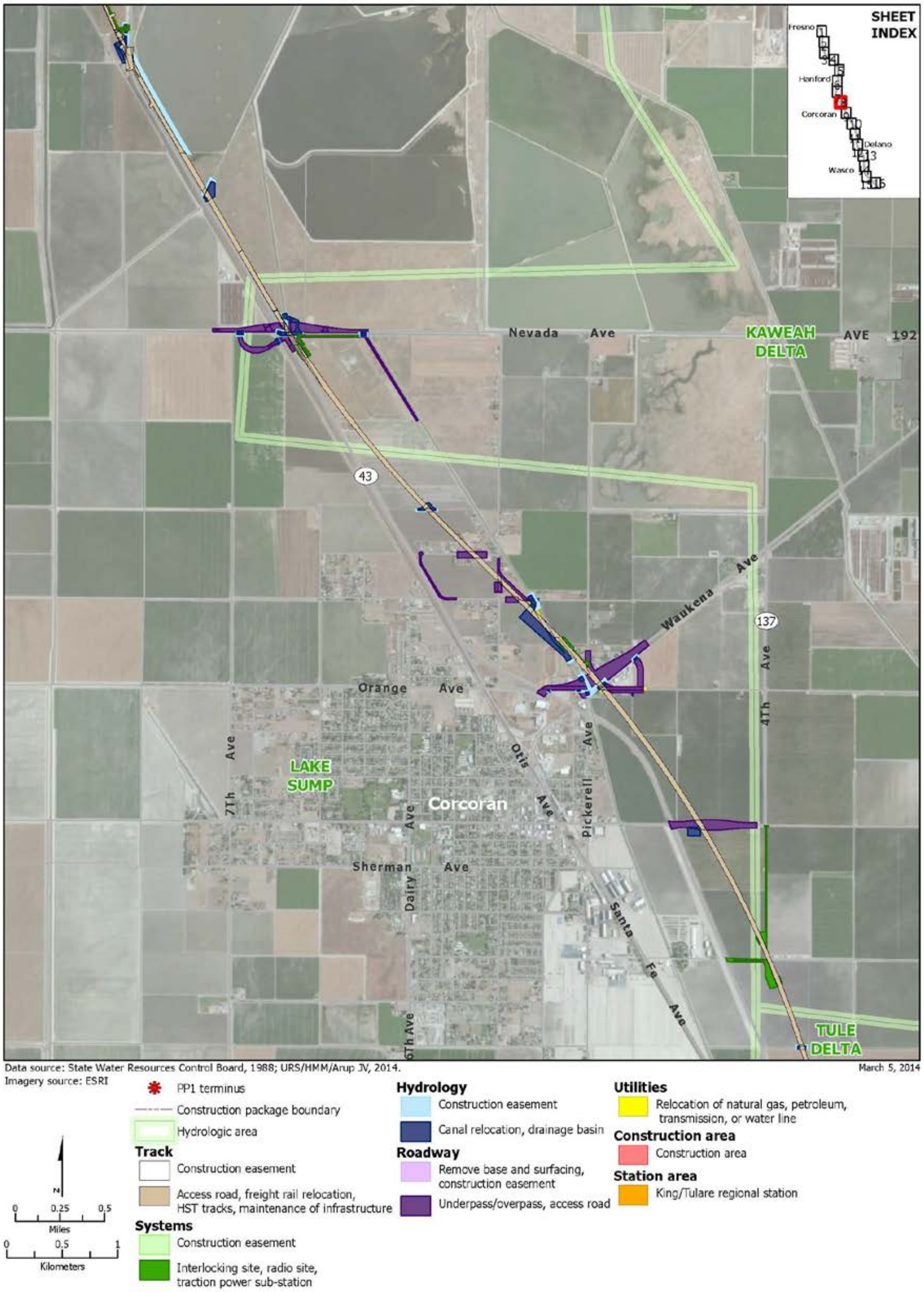


Figure 1-3
PP1 alignment construction elements
Sheet 8 of 16

RFP No.: 13-57 – Addendum No. 5 - 10/09/2014

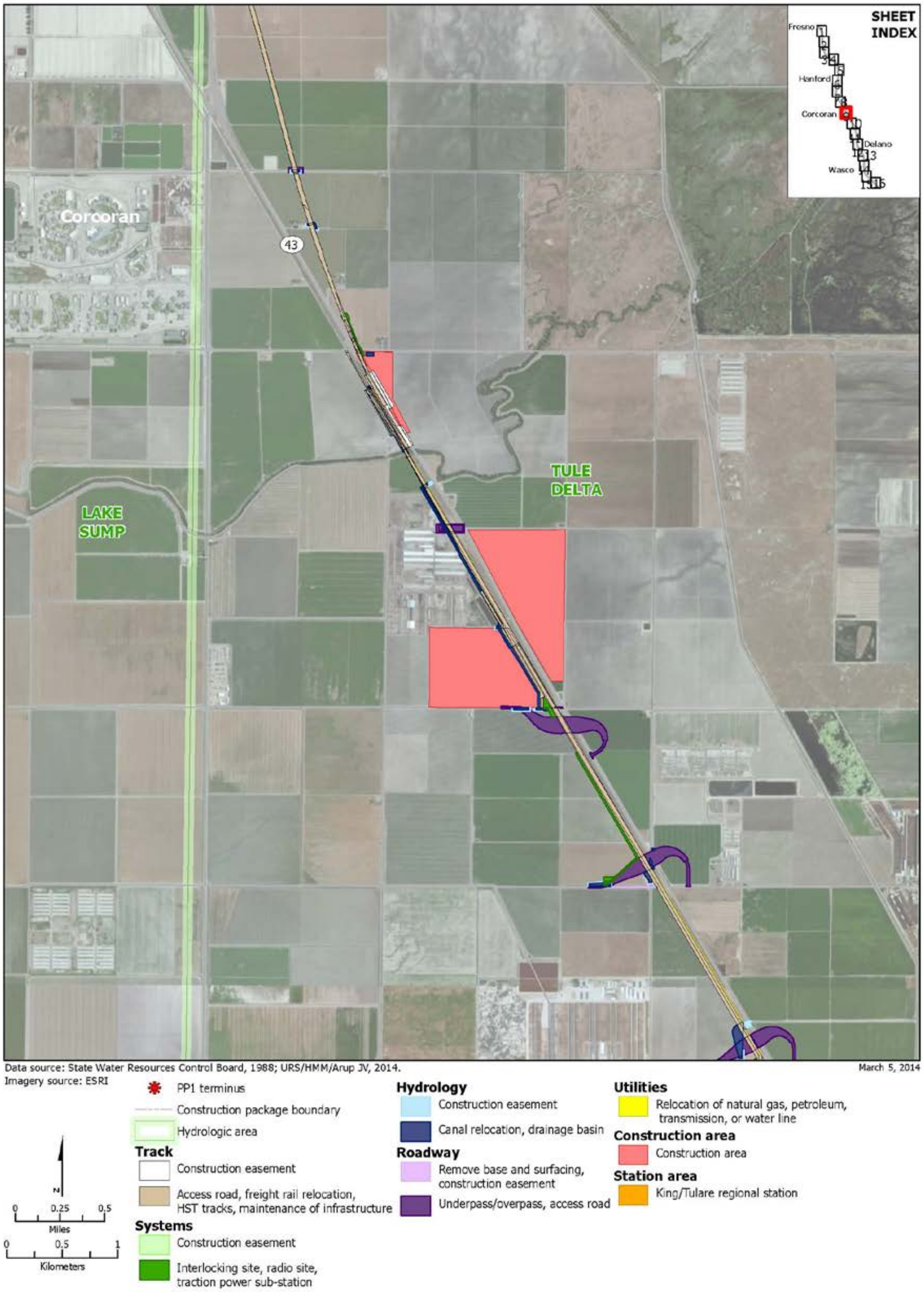


Figure 1-3
PP1 alignment construction elements
Sheet 9 of 16

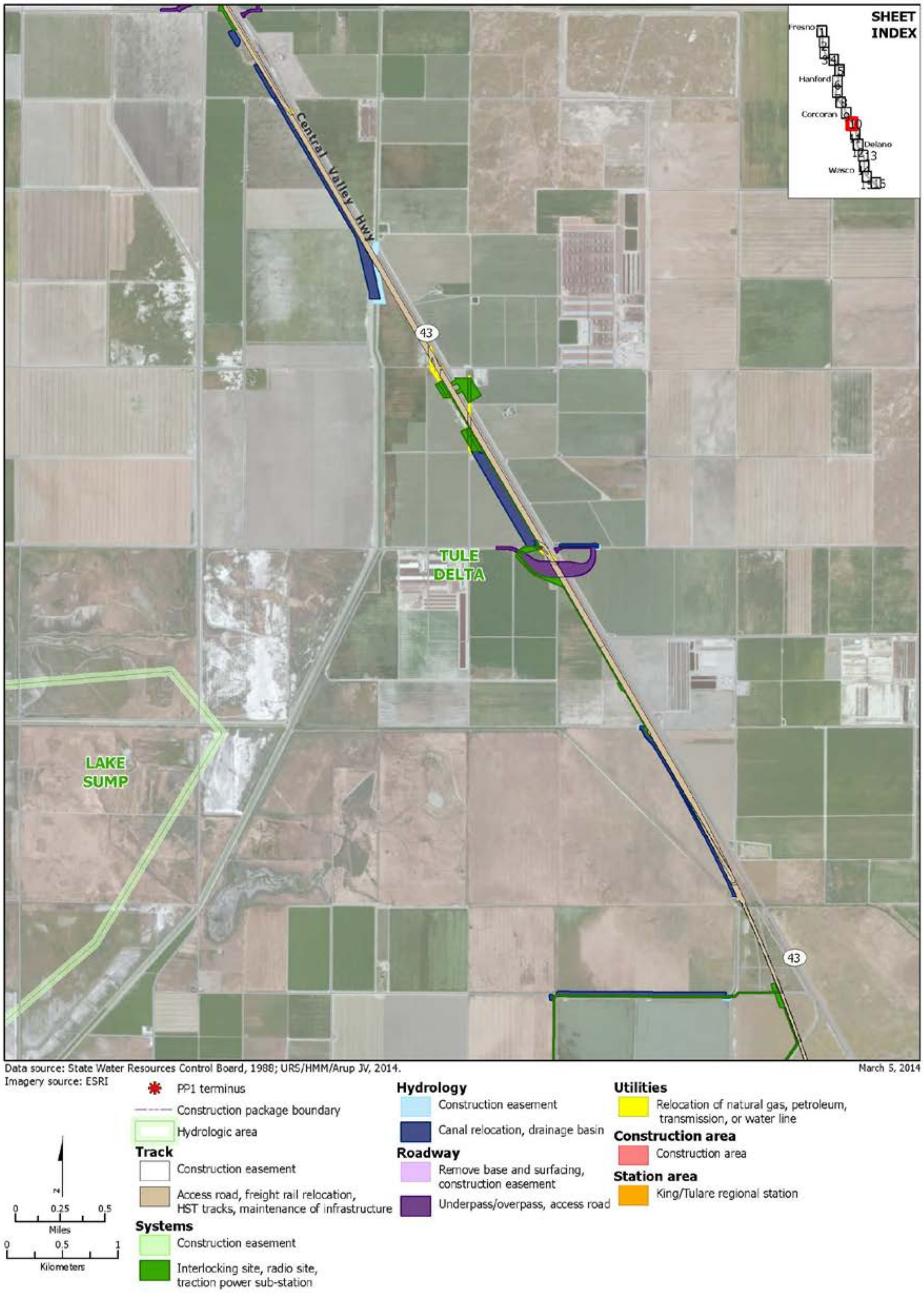


Figure 1-3
PP1 alignment construction elements
Sheet 10 of 16

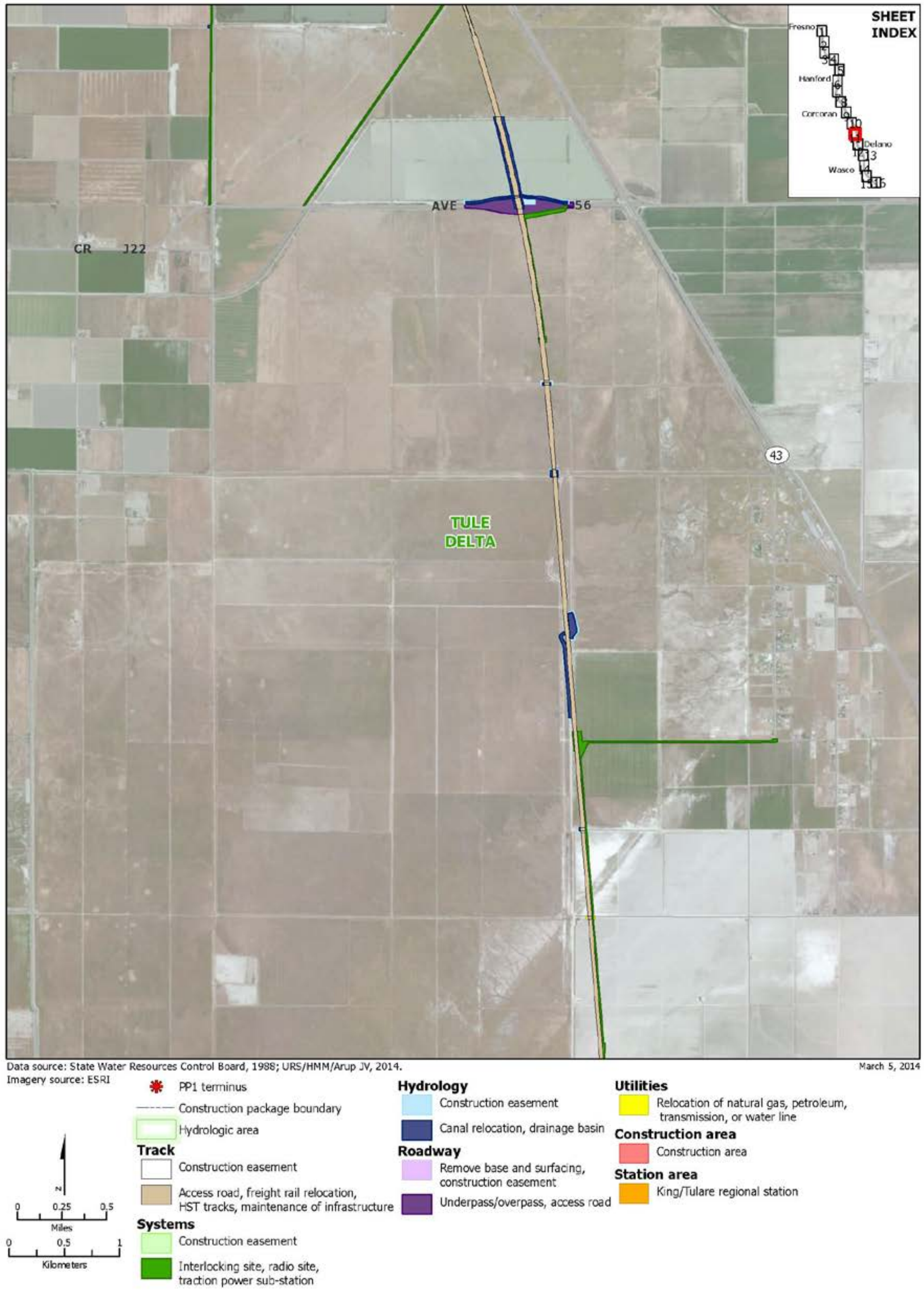


Figure 1-3
PP1 alignment construction elements
Sheet 11 of 16

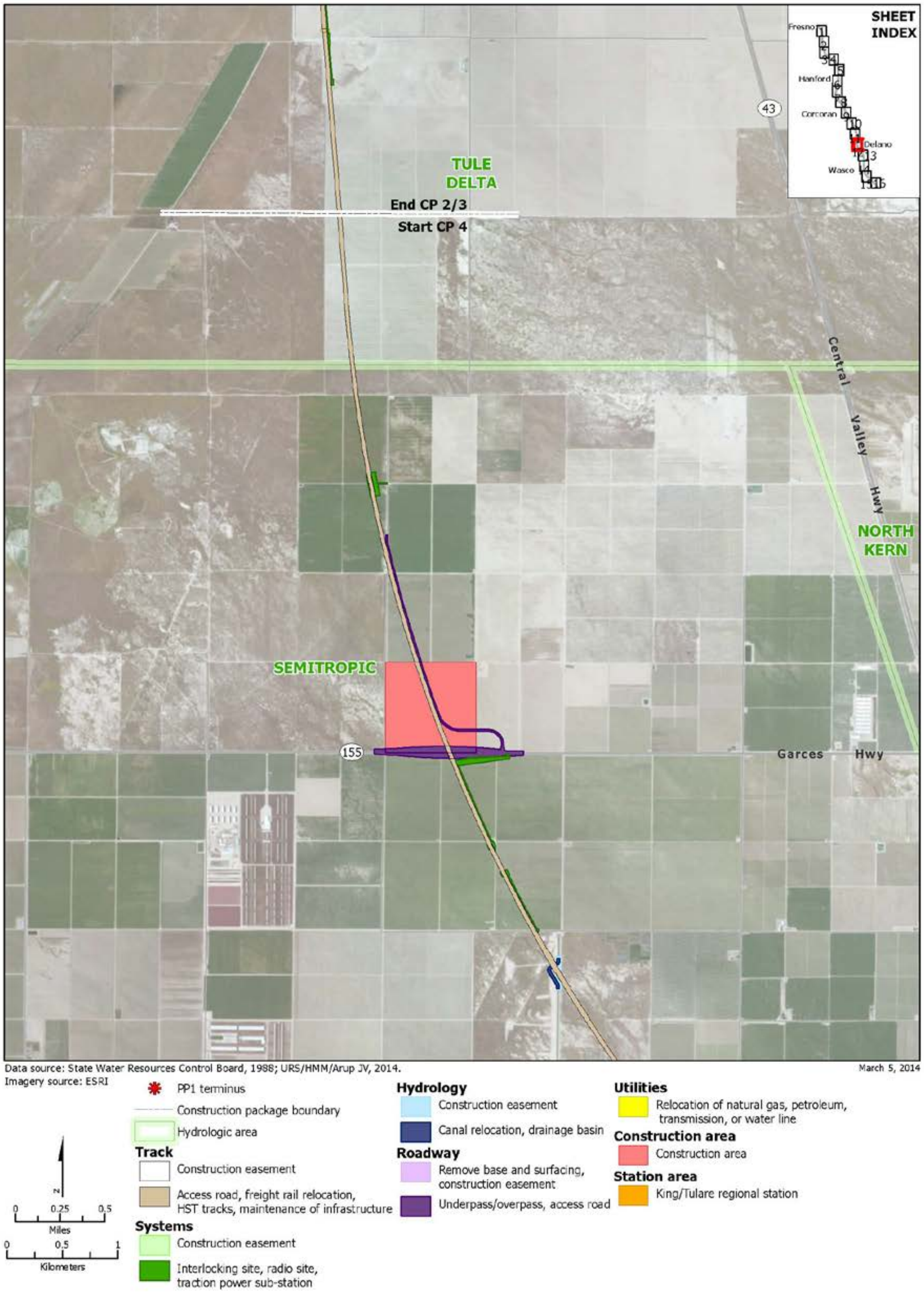


Figure 1-3
PP1 alignment construction elements
Sheet 12 of 16

RFP No.: 13-57 – Addendum No. 5 - 10/09/2014

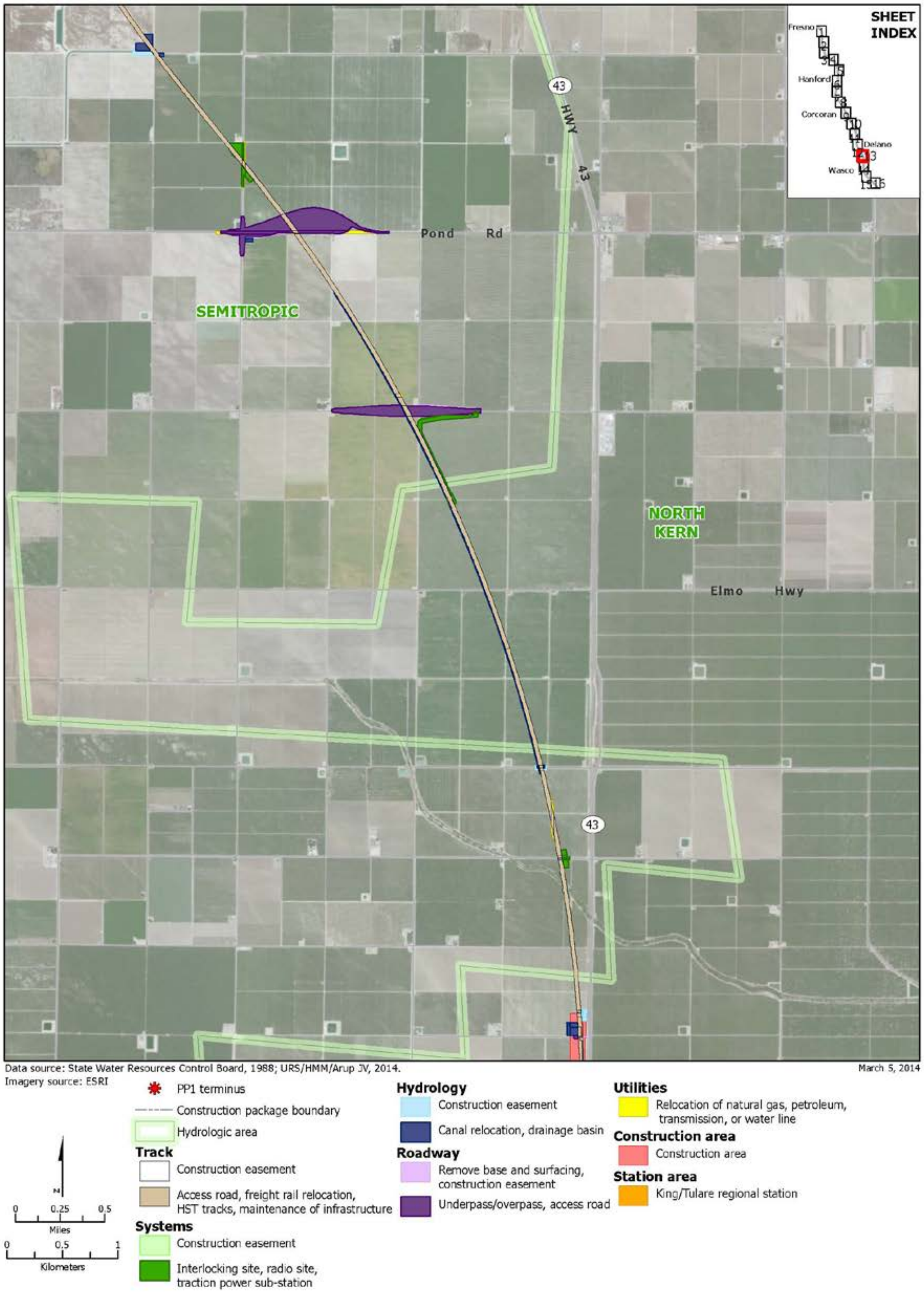


Figure 1-3
PP1 alignment construction elements
Sheet 13 of 16

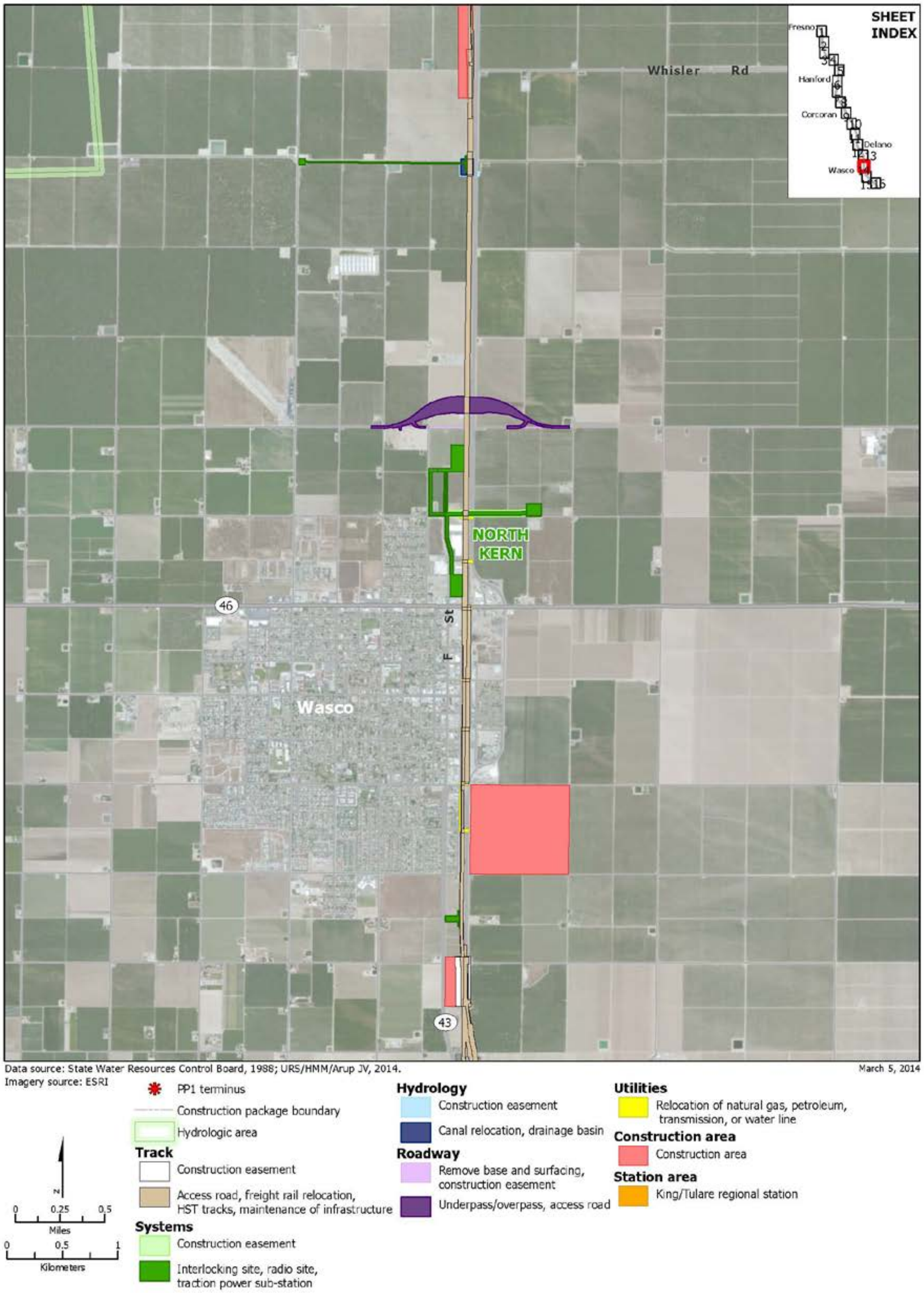


Figure 1-3
PP1 alignment construction elements
Sheet 14 of 16

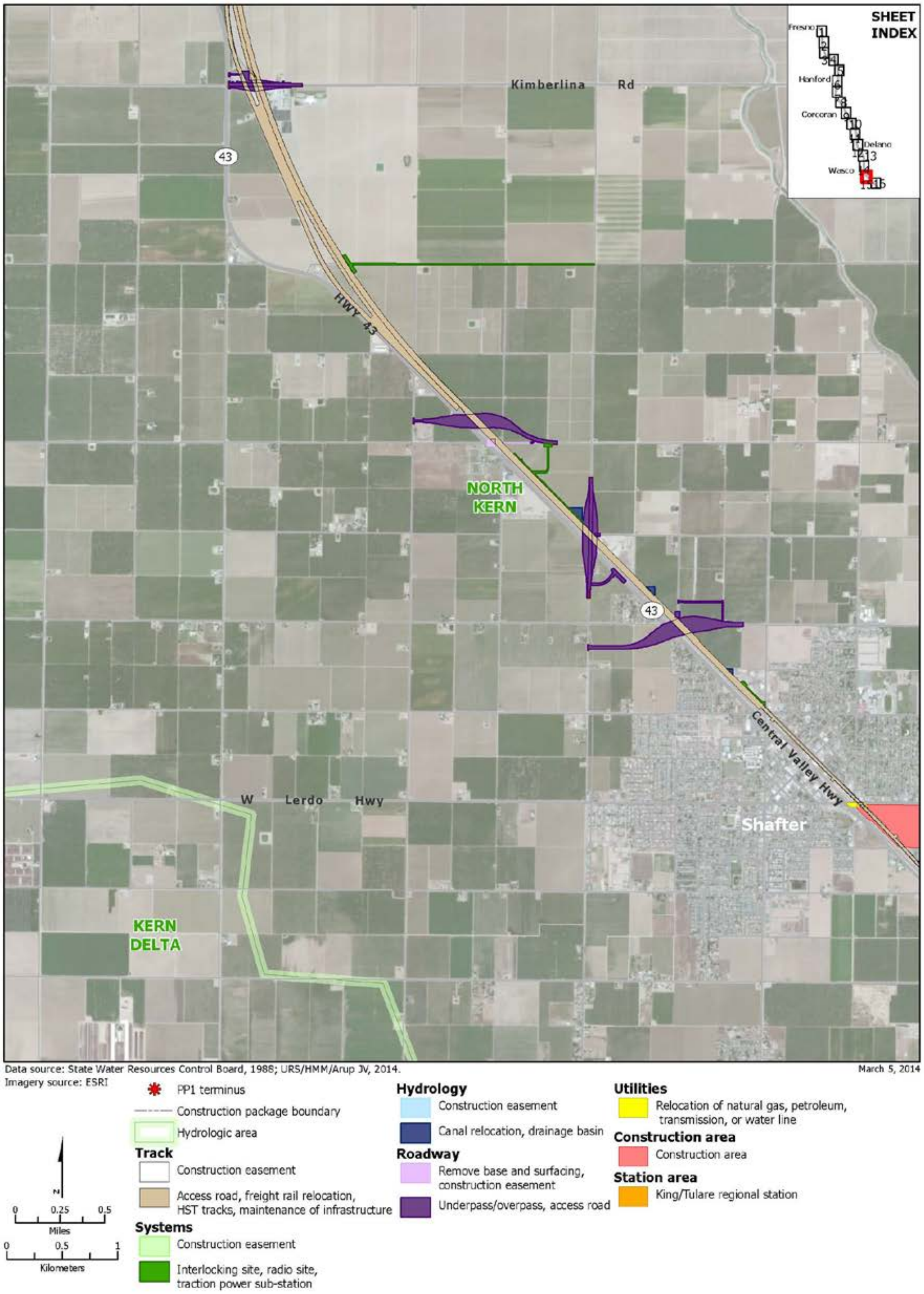


Figure 1-3
PP1 alignment construction elements
Sheet 15 of 16

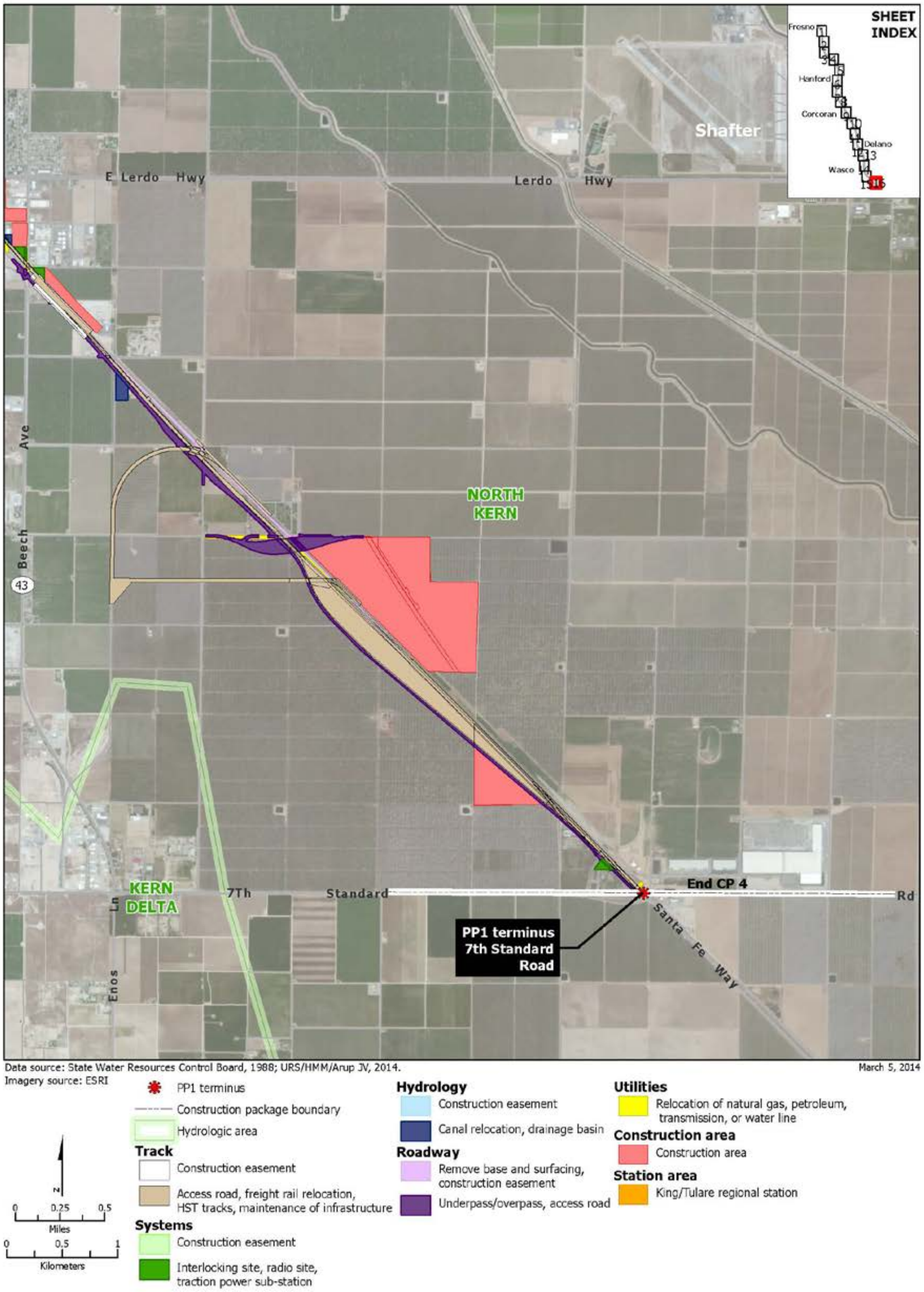


Figure 1-3
PP1 alignment construction elements
Sheet 16 of 16

RFP No.: 13-57 – Addendum No. 5 - 10/09/2014

2.0 HST System Infrastructure

The following section provides general information about the components and function of the proposed HST System. The infrastructure and systems of the HST alternatives are composed of trains (rolling stock), tracks, stations, train control, power systems, and maintenance facilities. The design of each HST alternative includes a double-track rail system to accommodate planned project operational needs for uninterrupted rail movement. Additionally, the HST safety criteria recommend avoidance of at-grade intersections on dedicated HST alignments and, therefore, the system must be grade-separated from any other transportation system. This means that planning the HST System would also require grade-separated overcrossings or undercrossings for roadways or roadway closures and modifications to existing systems that do not span planned rights-of-way. In some situations, it would be more efficient for the HST project to be elevated over existing facilities.

2.1 System Design Performance, Safety, and Security

The proposed California HST System has been designed for optimal performance and to conform to industry standards and federal and state safety regulations (Table 2-1). The HST System would be a fully grade-separated and access-controlled guideway with intrusion detection and monitoring systems where required. This means that the HST infrastructure (e.g., mainline tracks and maintenance and storage facilities) would be designed to prevent access by unauthorized vehicles, persons, animals, and objects. The capital cost estimates, presented in Chapter 5 of the Project EIR/EIS, include allowances for appropriate barriers (fences and walls), state-of-the-art communication, access-control, and monitoring and detection systems. Not only would the guideway be designed to keep persons, animals, and obstructions off the tracks, the ends of the HST trainsets would include a collision response management (CRM) system to minimize the effects of a collision. All aspects of the HST System would conform to the latest federal requirements regarding transportation security. The HST trainsets (train cars) would be pressure-sealed to maintain passenger comfort regardless of aerodynamic change, much like an airplane body does.

Table 2-1
HST Performance Criteria

Category	Criteria
System Design Criteria	Electric propulsion system Fully grade-separated guideway Fully access-controlled guideway with intrusion monitoring systems where required Track geometry to maintain passenger comfort criteria (smoothness of ride, lateral acceleration less than 0.1 g [i.e., acceleration due to gravity])
System Capacity	Fully dual-track mainline with off-line station stopping tracks Capable of accommodating a wide range of passenger demand (up to 20,000 passengers per hour per direction) Capable of accommodating normal maintenance activities without disruption to daily operations
Level of Service	Capable of accommodating a wide range of service types (express, semi-express/limited stop, and local)

Table 2-1
HST Performance Criteria

Category	Criteria
System Capabilities	Capable of traveling from San Francisco to Los Angeles in approximately 2 hours and 40 minutes
	All-weather/all-season operation
	Capable of sustained vertical gradient of 2.5% without considerable degradation in performance
	Capable of operating parcel and special freight service as a secondary use
	Capable of safe, comfortable, and efficient operation at speeds over 200 mph
	Capable of maintaining operations at 3-minute headways
	Equipped with high-capacity and redundant communications systems capable of supporting fully automatic train control

HST operation would follow safety and security plans developed by the Authority in cooperation with FRA to include the following:

- A System Safety Program Plan, including a Safety and Security Certification Program, which would be developed during the final design and construction phases to address safety, security, and emergency response as it relates to the day-to-day operation of the system.
- A Threat and Vulnerability Assessment for security and a Preliminary Hazard Analysis and Vehicle Hazard Analysis for safety during the preliminary engineering phase to produce comprehensive design criteria for safety and security requirements mandated by local, state, or federal regulations and industry best practices.
- A Fire Life Safety Program and a System Security Plan. Under federal and state guidelines and criteria, the Fire Life Safety Plan would address the safety of passengers and employees as it relates to emergency response. The System Security Plan would address design features of the project intended to maintain security at the stations, within the trackwork right-of-way, and onboard trains. Compliance with these measures would maximize the safety and security of passengers and employees of the HST project so that adverse safety and security impacts would be less than significant.

Design criteria would address FRA safety standards and requirements as well as the Petition for Rule of Particular Applicability (RPA) that addresses specifications for key design elements for the system. The FRA is currently developing safety requirements for HSTs for use in the United States. The FRA will require that the HST safety regulations be met prior to revenue service operations. The following section describes those system components pertinent to the Fresno to Bakersfield Section.

2.2 Vehicles

Although the exact vehicle-type has not yet been selected, the environmental analyses considered the impacts associated with any of the HST vehicles produced in the world that meet the Authority's criteria. All of the world's HST systems in operation today use electric propulsion with power supplied by an overhead system. These include, among many others, the Train à Grande Vitesse (TGV) in France, the Shinkansen in Japan and Taiwan, and the InterCity Express (ICE) in Germany. See Figure 2-1 for examples of typical HSTs.

Figure 2-1
Examples of Japanese Shinkansen high-speed trains

The Authority is considering an electric multiple unit (EMU) concept that would equip several train cars (including both end cars) with traction motors compared to a locomotive-hauled train (i.e., one engine in the front and one in the rear). Each train car would have an active suspension and each powered car would have an independent regenerative braking system (which returns power to the power system). The body would be made of lightweight but strong materials and would have an aerodynamic shape to minimize air resistance, much like a curved airplane body.

A typical train would be 9 to 11 feet wide, consisting of two trainsets, each approximately 660 feet long and consisting of eight cars. A train of two trainsets would seat up to 1,000 passengers, and be approximately 1,320 feet long with 16 cars. The power would be distributed to each train car via the overhead contact system (which are a series of wires strung above the tracks) and through a pair of pantographs that reach like antennae above the train (see Figure 2-2). Each trainset would have a train control system that could be independently monitored with override control while also communicating with the systemwide Operations Control Center. Phase 1 HST service is expected to need up to 94 sets of trains in 2035, depending on the HST fares charged.

Figure 2-2
Example of an at-grade profile showing contact wire system and vertical arms of the pantograph power pickups

A computer-based automatic train control (ATC) system would control the trains. The ATC system would provide for the FRA-mandated positive train-control safety requirements, including safe separation of trains, over-speed prevention, and work zone protection. This would use a radio-based communications network that would include a fiber optic backbone and communications towers approximately every 2 to 3 miles, depending on the terrain and selected radio frequency. Ideally, the towers would be located near the HST corridor in a fenced area of approximately 20 feet by 15 feet, including a 10-foot by 8-foot communications shelter and a 6- to 8-foot-diameter, 100-foot-tall communications pole. These communications facilities could be co-located with the traction power substations.

2.3 Stations

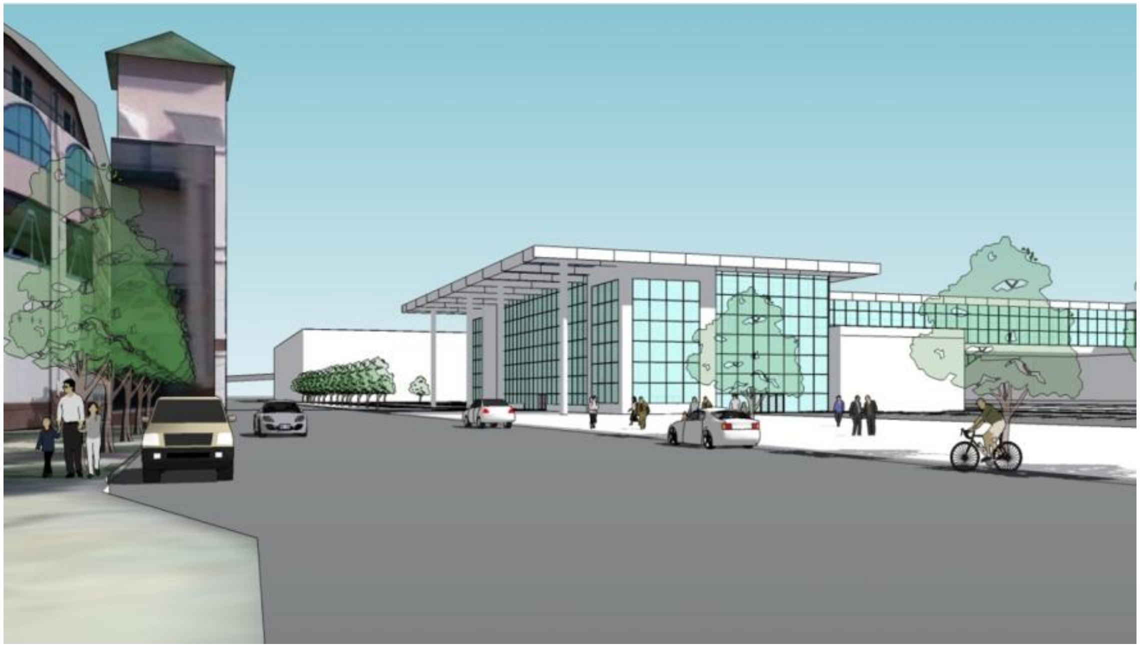
The design of the station areas would provide intermodal connectivity, drop-off facilities, an entry plaza, a station house area for ticketing and support services, an indoor station room where passengers wait and access the HST, and parking facilities. Station design has not progressed

beyond the conceptual stage. Figure 2-3 shows examples of station components from existing systems overseas; Figure 2-4 shows a potential "functional" station and a plan view of various station components. The functional station is a basic design that could be more elaborate with cooperation from the local jurisdiction; the station has the potential to be an iconic building that would help define the downtown transit core. Preliminary station planning and design are based on dimensional data from Station Platform Geometric Design guidance (Authority 2008) and volumetric data from Station Program Design Guidelines (Authority 2009). All stations would be designed in accordance with Americans with Disabilities Act (ADA) accessibility guidelines. The Fresno to Bakersfield Section would include a station in Fresno, a Kings/Tulare Regional station in the Hanford area, and a station in Bakersfield.

Figure 2-3
Examples of existing stations

2.3.1 Station Platforms and Trackway (Station Box)

The station would provide a sheltered area and platforms for passenger waiting and circulation elements (stairs, elevators, escalators). Of the four tracks passing through the station, the two express tracks (for trains that do not stop at the station) would be separated from those that stop at the station and platforms. To allow enough distance for safe deceleration of trains, a platform track would diverge from each mainline track, beginning 3,000 feet from the center of the 1,410-foot station platform. To provide enough distance for acceleration back to the main line, less distance is needed before rejoining the main line but an additional stub end refuge track would be provided to temporarily store HST trains in case of mechanical difficulty, for special scheduling purposes, and for daytime storage of maintenance-of-way work trains during periods when structure and track maintenance is being performed along the line around the station. The wider footprint for the four-track section thus extends for a total distance of 6,000 feet.



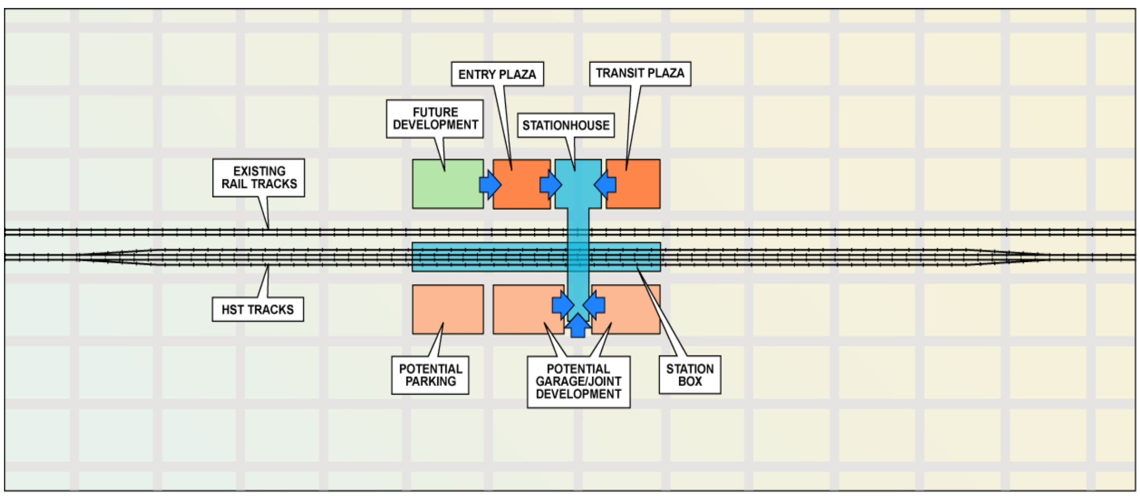


Figure 2-4
Simulated and plan views of a functional station and its various components

2.3.2 Station Arrival/Departure Facility (Station House)

The station house would be adjacent to the primary entrance and plazas. The station house would be open to both patrons and visitors. Services within the station house may include initial ticketing and check-in, traveler's aid and local information services, and concessions. Circulation linkages between the station house and the station platforms may include hallways, an access bridge to cross over railroad tracks, stairs, escalators, elevators, and/or moving sidewalks.

Station Parking Facilities

Parking demand expectations are based on HST System ridership forecasts where parking availability is assumed to be unconstrained—meaning 100% of parking demand is assumed to be met. These projections provide a "high" starting point to inform discussions with cities where stations are proposed. While the project EIR/EIS identifies locations for parking facilities needed to satisfy the maximum forecast demand, parking is anticipated to be developed over time in phases, while also prioritizing access to the HST System through other modes such as transit, which could lead to less parking being necessary.

2.4 Infrastructure Components

The dedicated, fully grade-separated right-of-way needed to operate high-speed trains has more-stringent alignment requirements than those needed for lower-speed trains. In the Fresno to Bakersfield Section, the HST alternatives would use four different track profiles. These track types have varying profiles: low, near-the-ground tracks are at-grade; higher tracks are elevated or on retained fill (earth); and below-grade tracks are in a retained cut. Types of bridges that might be built include full channel spans, large box culverts, or, for some wider river crossings, limited piers within the ordinary high-water channel. The various track profiles are described below.

2.4.1 At-Grade Profile

At-grade track profiles (Figure 2-5) are best suited in areas where the ground is relatively flat, as in the Central Valley, and in rural areas where interference with local roadways is less. The at-grade track would be built on compacted soil and ballast material (a thick bed of angular rock) to prevent subsidence or changes in the track surface from soil movement. To avoid potential disruption of service from floodwater, the rail would be constructed above the 100-year floodplain. The height of the at-grade profile may vary to accommodate slight changes in topography and to provide clearance for stormwater culverts and structures to allow water flow, and sometimes, wildlife movement.

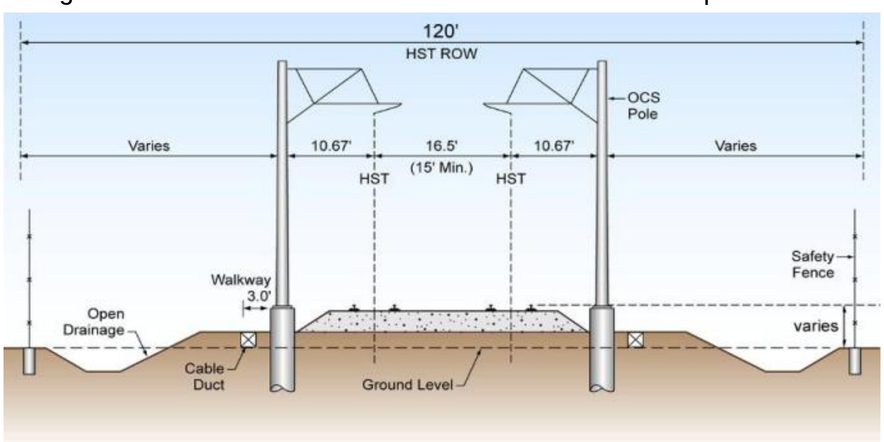


Figure 2-5
At-grade typical cross section

RFP No.: 13-57 – Addendum No. 5 - 10/09/2014

2.4.2 Retained-Fill Profile

Retained-fill profiles (Figure 2-6) are used when it is necessary to narrow the right-of-way within a constrained corridor to minimize property acquisition or to transition between an at-grade and elevated profile. The guideway would be raised off the existing ground on a retained-fill platform made of reinforced walls, much like a freeway ramp. Short retaining walls would have a similar effect and would protect the adjacent properties from a slope extending beyond the rail guideway.

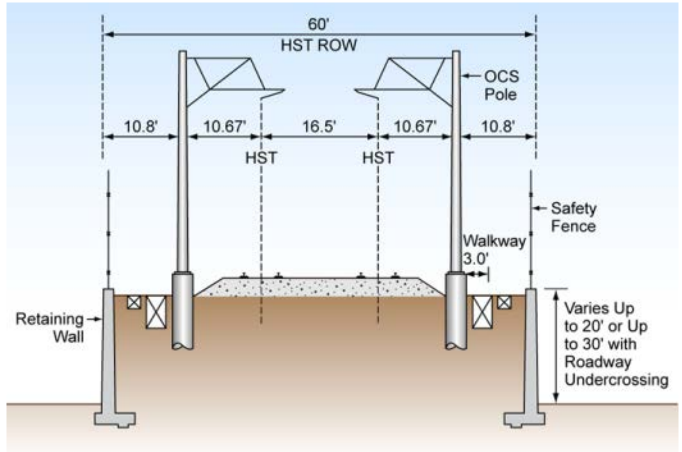


Figure 2-6
Retained-fill typical cross section

2.4.3 Retained-Cut Profile

Retained-cut profiles (Figure 2-7) are used when the rail alignment crosses under existing rail tracks, roads, or highways that are at-grade. This profile type is used only for short distances in highly urbanized and constrained situations. In some cases, it is less disruptive to the existing traffic network to depress the rail profile under these crossing roadways. Retaining walls would typically be needed to protect the adjacent properties from a cut slope extending beyond the rail guideway. Retained cut profiles are also used for roads or highways when it is more desirable to depress the roadway underneath an at-grade HST alignment.

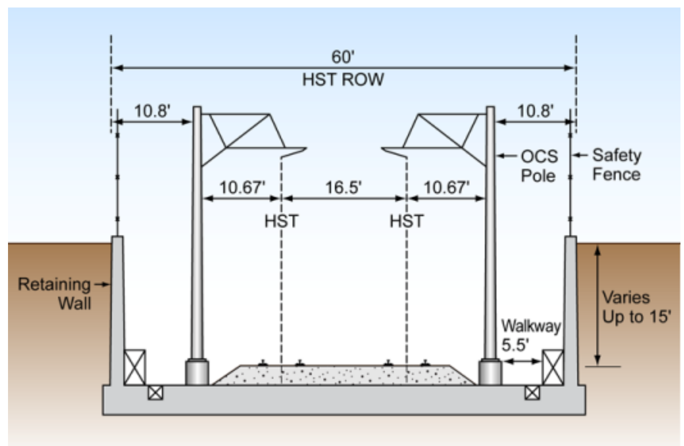
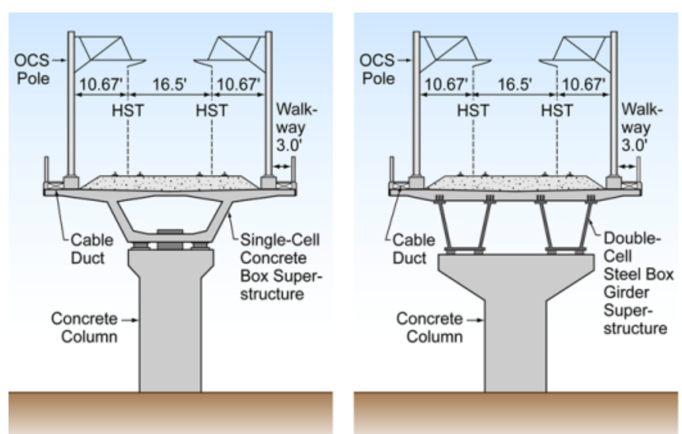


Figure 2-7
Retained-cut typical cross section

2.4.4 Elevated Profile

Elevated profiles (Figure 2-8) can be used in urban areas where extensive road networks must be maintained. An elevated profile must have a minimum clearance of approximately 16.5 feet over roadways and approximately 24 feet over railroads. Pier supports are typically approximately 10 feet in diameter at the ground. Such structures could also



(a) Concrete Superstructure **(b) Steel Superstructure**

Figure 2-8
Elevated structure typical cross sections

be used to cross water bodies; even though the trackway might be at- grade on either side, the width of the water channel could require a bridge at the same level, which would be built in the same way as the elevated profile.

Straddle Bents

When the HST elevated profile crosses over a roadway or railway on a very sharp skew (degree of difference from the perpendicular), a straddle bent ensures that the piers are outside of the functional/operational limit of the roadway or railway.

As shown in Figure 2-9, a straddle bent is a pier structure that spans (or straddles) the functional/operational limit of a roadway, highway, or railway. Typical roadway and highway crossings that have a smaller skew angle (i.e., the crossing is nearly perpendicular) generally use intermediate piers in medians and span the functional right-of-way. However, for larger-skew-angle crossing conditions, median piers would result in excessively long spans that are not feasible. Straddle bents that clear the functional right-of-way can be spaced as needed (typically 110 feet apart) to provide feasible span lengths for bridge crossings at larger skew angles.

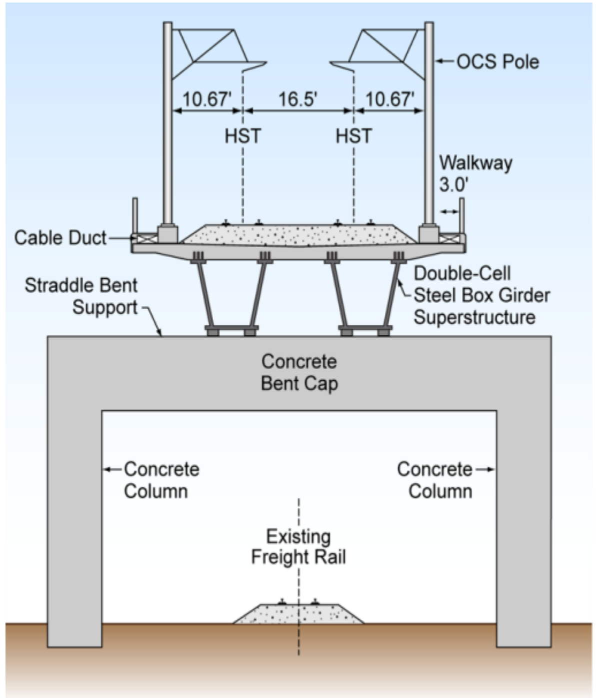


Figure 2-9
Straddle bent typical cross section

2.5 Grade Separations

A safely operating HST System consists of a fully grade-separated and access-controlled guideway. Unlike existing passenger and freight trains in the project area, there would be no at-grade road crossings, nor would the HST System share its rails with freight trains. The following list describes possible scenarios for HST grade separations:

- **Roadway overcrossings.** There are many roadway and state route facilities that currently cross at-grade with or over the BNSF railroad tracks. Figure 2-10 illustrates how a roadway would be grade-separated over both the HST and the railroad in these situations. Similar conditions occur where an at-grade HST alignment crosses rural roads adjacent to farmland. Figure 2-11 is an example of a typical roadway overcrossing of the HST tracks; these overcrossings would generally occur approximately every 2 miles to provide continued mobility for local residents and farm operations. For the Fresno to Bakersfield Section, overcrossings (or undercrossings) would be provided approximately every mile or less, due to existing roadway infrastructure. Overcrossings would have two lanes, each with a width of 12 feet. The shoulders would be 4 to 8 feet wide, depending on average daily traffic (ADT) volumes. The paved surface for vehicles would therefore range from 32 to 40 feet wide. Minimum clearance would be 27 feet over the HST. Specifications are based on county road standards.

- **Elevated HST road crossings.** In urban areas, it may be more feasible to raise the HST as shown previously in Figures 2-8 and 2-9. This is especially relevant in downtown urban areas where use of an elevated HST guideway would minimize impacts on the existing roadway system.
- **Roadway undercrossings**. HST alternatives may require undercrossings for the HST to travel over roadways. Figure 2-12 illustrates how a roadway would be grade-separated below the HST guideway.

2.6 Traction Power Distribution

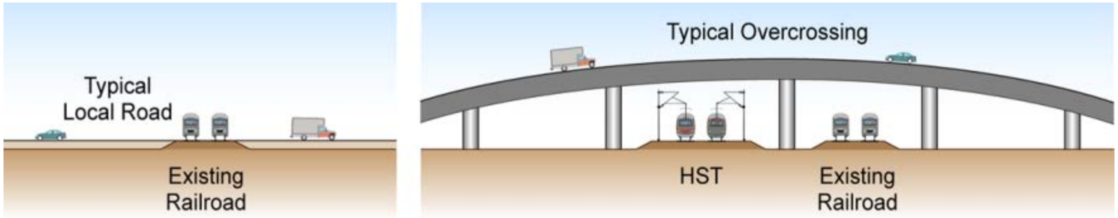
California's electricity grid would power the proposed HST System. The HST System is expected to require less than 1% of the state's future electricity consumption. In 2008, a study performed by Navigant Consulting, Inc. found that although the HST would be supplied with energy from the California grid, and although physical control of the flow of electricity from particular sources is not feasible (Navigant Consulting, Inc. 2008), it would be feasible for the Authority to obtain the quantity of power required for the HST from 100% clean, renewable energy sources through a variety of mechanisms, such as paying a clean-energy premium for the electricity consumed.

The project would not include the construction of a separate power source, although it would include the extension of power lines to a series of power substations positioned along the HST corridor. These power substations are needed to even out the power feed to the train system. Trains would draw electric power from an overhead contact system with the running rails acting as the other conductor. The contact system would consist of a series of mast poles approximately 23.5 feet higher than the top of the rail, with contact wires suspended from the mast poles between 17 to 19 feet from the top of the rail. The train would have an arm, called a pantograph, to maintain contact with this wire to provide power to the train. The mast poles would be spaced approximately every 200 feet along straight portions of the track down to every 70 feet in tight-turn track areas. The contact system would be connected to the substations, required at approximately 30-mile intervals. Statewide, the power supply would consist of a 2 by 25 kilovolt (kV) overhead contact system for all electrified portions of the statewide system. See Figure 2-2, which shows a typical overhead contact system.

2.6.1 Traction Power Substations

Based on the HST System's estimated power needs, traction power substations (TPSSs) would each need to be approximately 32,000 square feet (200 feet by 160 feet) and be located at approximately 30-mile intervals. Figure 2-13 shows a typical TPSS. TPSSs would have to accommodate the power substations and would require a substantial buffer area around them for safety purposes. For the Fresno to Bakersfield Section, electrical substations would be constructed at locations where high-voltage power lines cross the HST alignment. The TPSS could be screened from view with a wall or fence. Each TPSS site would have a 20-foot-wide access road (or easement) from the street access point to the protective fence perimeter at each parcel location. Each site would require a parcel of up to 2 acres. Each substation would include an approximately 450-square-foot control room (each alternative design includes these facilities, as appropriate).

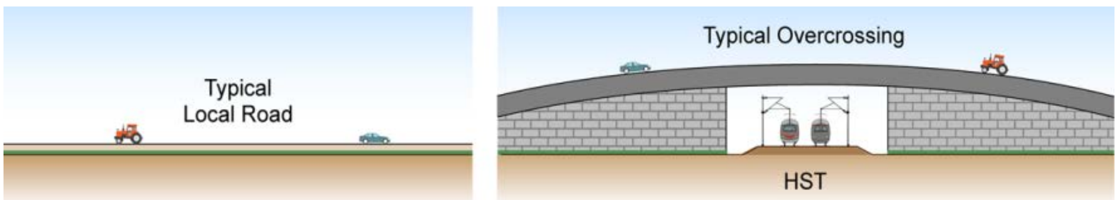
Power would be supplied by Pacific Gas and Electric Company (PG&E) transmission lines. PG&E has indicated that existing lines may need to be reconstructed to serve the project. This could consist of reconductoring transmission lines or installing new power poles. When electrification of the system is required, PG&E would design and implement changes to their transmission lines, including completion of environmental review and clearance of the reconstruction of transmission lines.



a) Existing Farm Roads

b) New Farm Road Overcrossing

Figure 2-10
Replacing local at-grade crossings with new overcrossings above HST guideway and existing railroad trackway



a) Existing Condition

b) Modified Condition

Figure 2-11
Adding local roadway overcrossings above HST guideway

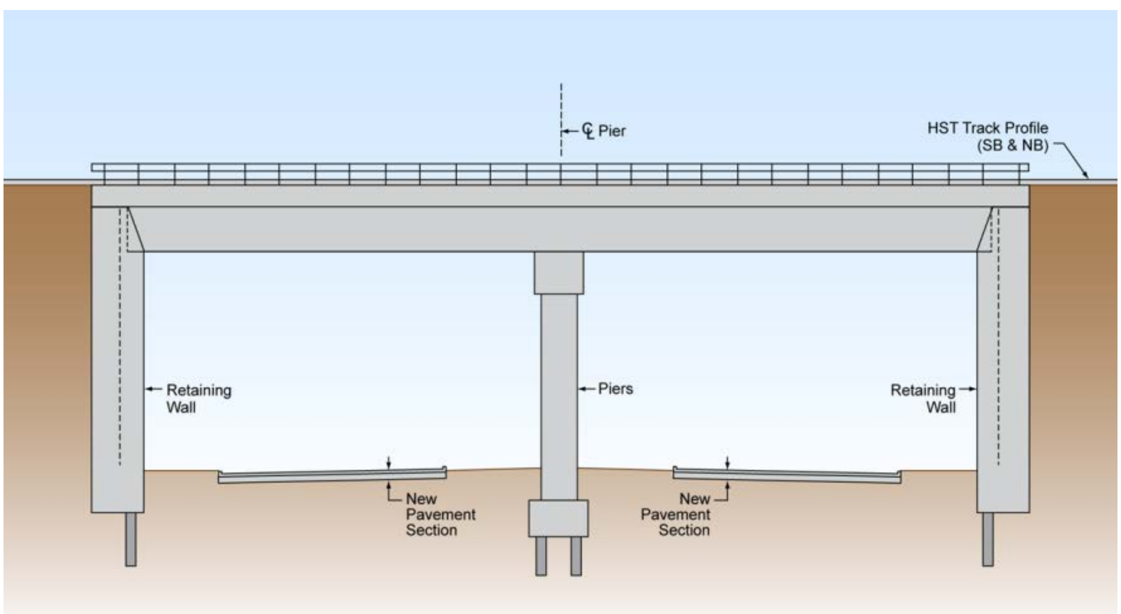


Figure 2-12
Typical cross section of roadway grade-separated beneath HST guideway

2.6.2 Switching and Paralleling Stations

Switching and paralleling stations work together to balance the electrical load between tracks, and to switch power off or on to either track in the event of an emergency. Switching stations (Figure 2-14) would be required at approximately 15-mile intervals, midway between the TPSSs. These stations would need to be approximately 9,600 square feet (120 feet by 80 feet). Paralleling stations (Figure 2-15) would be required at approximately 5-mile intervals between the switching stations and the TPSSs. The paralleling stations would need to be approximately 8,000 square feet (100 feet by 80 feet). Each station would include an approximately 450-square-foot (18 feet by 25 feet) control room. TPSS, traction power switching, and paralleling stations are included in each alternative design as appropriate.

Figure 2-13
Traction power substation

Figure 2-14
Switching station

2.6.3 Backup and Emergency Power Supply Sources for Stations and Facilities

During normal system operations, power would be provided by the local utility service and/or from the TPSS. Should the flow of power be interrupted, the system will automatically switch to a backup power source, through use of an emergency standby generator, an uninterruptable power supply, and/or a DC battery system.

Figure 2-15
Paralleling station

For the Fresno to Bakersfield Section, permanent emergency standby generators are anticipated to be located at passenger stations and at the heavy maintenance facility (HMF) and terminal layup/storage and maintenance facilities. These standby generators are required to be tested (typically once a month for a short duration) in accordance with National Fire Protection Association (NFPA) 110/111 to ensure their readiness for backup and emergency use. If needed, portable generators could also be transported to other trackside facilities to reduce the impact on system operations.

2.6.4 Signaling and Train-Control Elements

Signaling and train control elements include signal huts/bungalows within the right-of-way that house signal relay components and microprocessor components, cabling to the field hardware and track, signals, and switch machines on the track. These would be located in the vicinity of track switches, and would be grouped with other power, maintenance, station, and similar HST facilities, where possible.

2.7 Track Structure

The track structure would consist of either a direct fixation system (with track, rail fasteners, and slab), or ballasted track, depending on local conditions and decisions to be made in later design. Ballasted track requires more frequent maintenance than slab track, as described below, but is less expensive to install. For purposes of environmental review, slab track is assumed for long HST structures and ballasted track is assumed for at-grade sections and short HST structures. A subsequent environmental review will be performed if there is a significant change in the type of track structure following additional design and technical review.

2.8 Maintenance Facilities

The California HST System includes three types of maintenance facilities. Each section would have maintenance-of-way facilities and a number of overnight layover and servicing facilities would be distributed throughout the system. In addition, the HST System would have a single HMF (not included as part of PP1).

Maintenance-of-way facilities provide for equipment, materials, and replacement parts storage, and support quarters and staging areas for the HST System subdivision maintenance personnel. Each subdivision would cover about 150 miles; the maintenance-of-way facility would be centrally located in the subdivision. The facility would sit on a linear site adjacent to the HST tracks with a maximum width of two tracks, and would be approximately 0.75 mile long for a total size of 26 acres. One maintenance-of-way facility would be necessary in the Fresno to Bakersfield Section. This facility would be co-located with the HMF, if an HMF is provided in this project section. If an HMF is not provided in this project section, the maintenance-of-way facility would be located at one of the potential HMF sites identified in this EIR/EIS (see Section 2.4.6, Proposed Heavy-Maintenance Facility Locations). Additionally, for lengths of mainline track that are relatively distant from stations with refuge tracks and/or maintenance-of-way facilities, a refuge track would be sited to provide temporary storage of work trains as they perform maintenance in the vicinity of the track. The track would be approximately 1,600 feet long and would be connected to the main line. Access by road for work crews would be required, along with enough space to park work crew vans while working from the site and to drive the length of the track. The track and access area would be within the fenced and secure area of the HST line. The Fresno to Bakersfield Section would require a refuge track in the vicinity of Corcoran.

3.0 Description of Project Alternatives

The following sections are excerpted from the EIR/EIS and provide background information about each of the alignment and station alternatives that contribute to the Preferred Alternative. Specific information about PP1 is provided in the main supplement to the 401 permit application. The Preferred Alternative extends from Downtown Fresno to Downtown Bakersfield and includes portions of the BNSF Alternative in combination with the Corcoran Bypass, Allensworth Bypass, and Bakersfield Hybrid alternatives. Design features of the Preferred Alternative are summarized in Table 3-1. PP1 includes only a portion of the Preferred Alternative—the area from Monterey

Street in Fresno County to 7th Standard Road in Kern County. Design features of PP1 and the CP subsections are summarized in Table 3-2. Figure 1-2 shows the alignments.

Table 3-1
Design Features of Preferred Alternative

Design Features	Sections of the BNSF	Corcoran Bypass	Allensworth Bypass	Bakersfield Hybrid	Total
Total length[a] (linear miles)	74	10	21	12	117
At-grade profile[a] (linear miles)	50	7	18	2	77
Elevated profile[a] (linear miles, including retained fill)	23	3	3	10	39
Below-grade profile[a] (linear miles)	1	0	0	0	1
Number of straddle bents	0	0	0	31	31
Number of railroad crossings	5	1	1	3	10
Number of major water crossings	4	1	2	1	8
Number of road crossings	116	12	10	55	193
Approximate number of roadway closures[b]	34	7	3	11	55
Number of roadway overcrossings and undercrossings	40	4	4	1	49

Notes:
[a] Lengths shown are based on equivalent dual-track alignments. For example, the length of single-track elevated structure will be divided by a factor of 2 to convert to dual-track equivalents.
[b] Includes public and private road closures.

Table 3-2
Design Features in PP1 Alignment

Design Feature	CP 1C	CP 2/3	CP 4	PP1
Total length (linear miles)	5	63	31	99
At-grade profile (linear miles)[a]	3	54	26	83
Below-grade profile (linear miles)	1	0	0	1
Elevated profile (linear miles)	1	9	5	15
Number of major water crossings	0	6	1	7
Number of roadway overcrossings and undercrossings	2	32	9	43
Number of dedicated wildlife crossing structures	0	70	33	103
Kings/Tulare Regional Station–East	0	1	0	1
Maintenance of way or maintenance of infrastructure facilities	0[b]	2	0	2

[a] The linear miles of at-grade tracks includes the retained fill profile tracks.
[b] Although the majority of the maintenance of infrastructure facility is located within CP 2/3, the northern extent of the facility is located in CP 1C.

3.1 BNSF Alternative

This section provides a detailed description of the BNSF Alternative. The 15% design drawings showing the track alignments, profiles, structures, typical sections, construction use areas, and other preliminary design information are included as Volume III (Alignments and Other Plans) of the project EIR/EIS and available on the Authority's web site (www.hsr.ca.gov) or on CD by request.

3.1.1 Alignment Requirements

The alignment for the BNSF Alternative traverses urban downtown areas in the cities of Fresno and Bakersfield. It is generally adjacent to the BNSF Railway. Some of the main requirements are described below.

- **Operational Facilities**: HST operational requires TPSSs, switching stations, paralleling stations, and underground or overhead power transmission lines. Working in coordination with power supply companies and per design requirements, the Authority and FRA have identified frequency and right-of-way requirements for these facilities.
- **Frontage Road and Local Roadway Crossings**: As the alignment travels through rural regions, it can affect existing local frontage roads used by small communities and farm operations. Where these frontage roads are affected by the HST alignment, they would be shifted and reconstructed to maintain their function. Where roads are perpendicular to the proposed HST, overcrossings or undercrossings are planned at a minimum of every 2 miles. As discussed in project EIR/EIS Section 2.2.5, overcrossings or undercrossings for the Fresno to Bakersfield Section would be provided approximately every mile or less, due to existing roadway infrastructure. In between, some roads may be closed. These modifications are identified on project maps, and detailed lists are provided in Appendix 2-A of the project EIR/EIS.
- **Irrigation and Drainage Facilities**: The HST alignment would affect some existing drainage and irrigation facilities. Depending on the extent of the impact, existing facilities would be modified, improved, or replaced, as needed, to maintain existing drainage and irrigation functions and to support HST drainage requirements.
- **Wildlife Crossing Structures**: Wildlife crossing opportunities would be available through a variety of engineered structures. In addition to dedicated wildlife crossing structures, wildlife crossing opportunities would also be available at elevated portions of the alignment, at bridges over riparian corridors, at road overcrossings and undercrossings, and at drainage facilities (i.e., large-diameter [60–120 inches] culverts and paired 30-inch culverts).

  Dedicated wildlife crossing structures would be provided from approximately Cross Creek (Kings County) south to Poso Creek (Kern County) in at-grade portions of the railroad embankment at approximately 0.3-mile intervals. Where bridges, aerial structures, and road crossings coincide with proposed dedicated wildlife crossing structures, such features would serve the function of, and supersede the need for, dedicated wildlife crossing structures. Project design plans will be further refined to identify optimal wildlife-friendly crossing locations to maintain or enhance crossing, dispersal, and migration opportunities for wildlife across the HST alternatives.

  The preliminary wildlife crossing structure design consists of modified culverts in the embankment that would support the HST tracks. The typical culvert from end-to-end would be 73 feet long (crossing-structure distance), would span a width of approximately 10 feet (crossing-structure width), and provide 3 feet of vertical clearance (crossing-structure

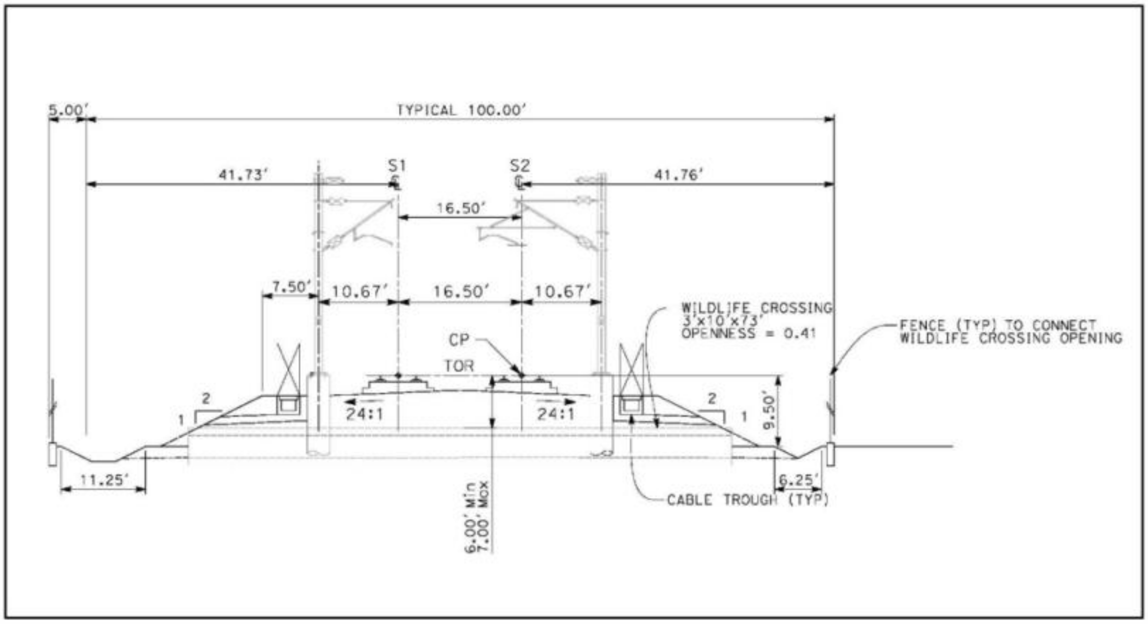
height), resulting in a calculated openness factor (Bremner-Harrison et al. 2007) of 0.41.[1] To accommodate variations in the topography, the height of the at-grade profile may require depressing wildlife crossing structures no more than 1.5 feet (half of the vertical clearance) below-grade.

At locations where stormwater swales parallel the embankment, the approach to wildlife crossing structures would be designed in such a way as to minimize the amount of surface water runoff entering the structure. A small berm (or lip) would be constructed at the entrance of the wildlife structure to prevent water from entering during small storm events. Swales would be directed around this lip. To allow wildlife free passage through the crossing structures, HST right-of-way fencing would be constructed at the toe of the slope, up the embankment, and around the entrance of the structure. At locations where an intrusion protection barrier parallels a proposed wildlife crossing structure, the crossing structure would be extended and designed to pass through the barrier to allow wildlife free passage. Figure 3-1 shows the wildlife crossing elevation and cross section, as well as the drainage detail.

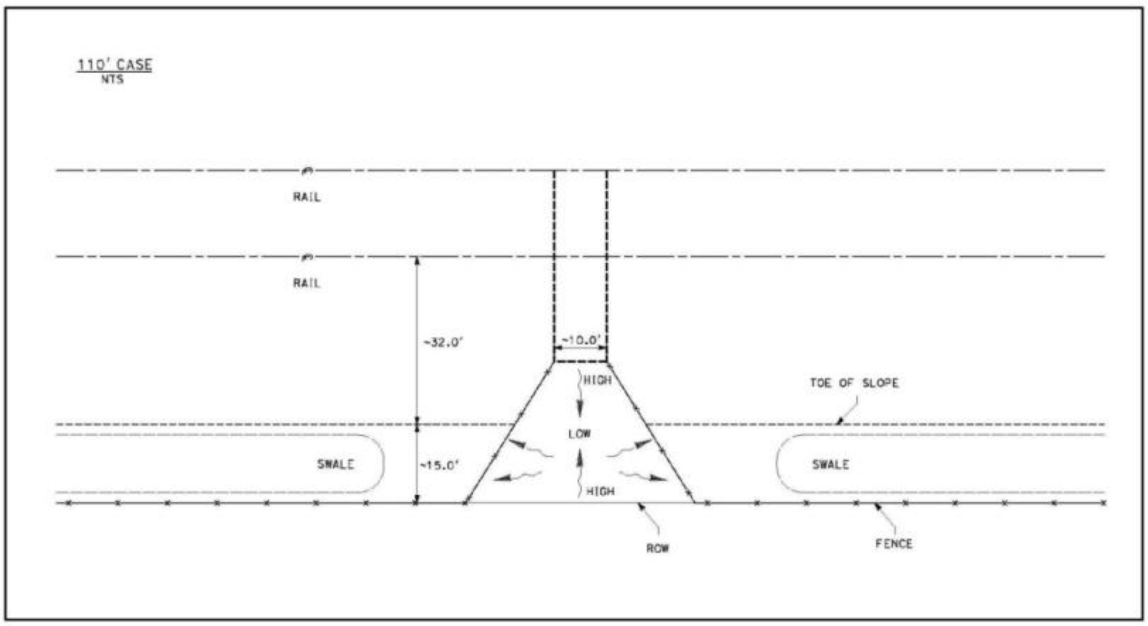
Additional wildlife crossing structure designs could include circular or elliptical pipe culverts, and larger (longer) culverts with crossing-structure distances of up to 100 feet. However, any changes to wildlife crossing structure design must be constrained by a minimum of 3 feet of vertical clearance (crossing-structure height), depressed no more than 1.5 feet below-grade (half of the vertical clearance), and must meet or exceed the minimum 0.41 openness factor.

Additionally, dedicated wildlife crossing structures would be placed to the north and south of each of the following river/creek crossings: Kings River, St. Johns Cut (Dutch Slough), Cole Slough, Cross Creek, Tule Creek, Poso Creek, Deer Creek, and Kern River. These wildlife crossing structures would be between 100 and 500 feet from the banks of each riparian corridor.

[1] (Height x Width)/Distance = Openness Factor; (4 ft x 8 ft)/72 ft = 0.44



a. Wildlife crossing elevation and cross section



b. Wildlife crossing drainage detail

Figure 3-1
Wildlife crossing structure

3.1.2 BNSF Adjacency

An important objective of the project is to align HST tracks adjacent to existing transportation corridors. The BNSF Alternative is designed to follow the existing BNSF Railway corridor adjacent to the BNSF mainline right-of-way as closely as practicable. Minor deviations from the BNSF Railway route are necessary to accommodate design requirements; namely, wider curves are necessary to accommodate the speed of the HST compared to the existing lower-speed freight line track alignment. The BNSF Alternative would not follow the BNSF Railway right-of-way between approximately East Conejo Avenue in Fresno County and Nevada Avenue in Kings County. Instead, the alignment would curve to the east on the north side of the Kings River and away from the city of Hanford, and would rejoin the BNSF Railway near the city of Corcoran.

The BNSF Alternative's cross sections include provisions for a 102-foot separation of the HST track centerline from the BNSF Railway track centerline, as well as for separations that include swale or berm protection or an intrusion protection barrier (wall) where the HST tracks are closer. Figure 3-2 shows cross sections of these various configurations where there would not be a shared right-of-way with BNSF. Figure 3-3 shows the same cross sections illustrating a shared right-of-way with BNSF; the design guidelines recognize BNSF as a potential shared corridor partner, which in some locations could reduce the horizontal separation of the HST from the BNSF Railway facility by as much as 25 feet, assuming the appropriate intrusion protection barrier is provided.

For purposes of the project EIR/EIS, it is assumed no encroachment on the BNSF right-of-way would occur. A 102-foot separation between the centerlines of BNSF Railway and HST tracks is provided wherever feasible and appropriate. In urban areas where a 102-foot separation could result in substantial displacement of businesses, homes, and infrastructure, the separation between the BNSF Railway and the HST was reduced. The areas with reduced separation require protection to prevent encroachment on the HST right-of-way, in the event of a freight rail derailment. Protection would consist of a swale, berm, or wall, depending on the separation.

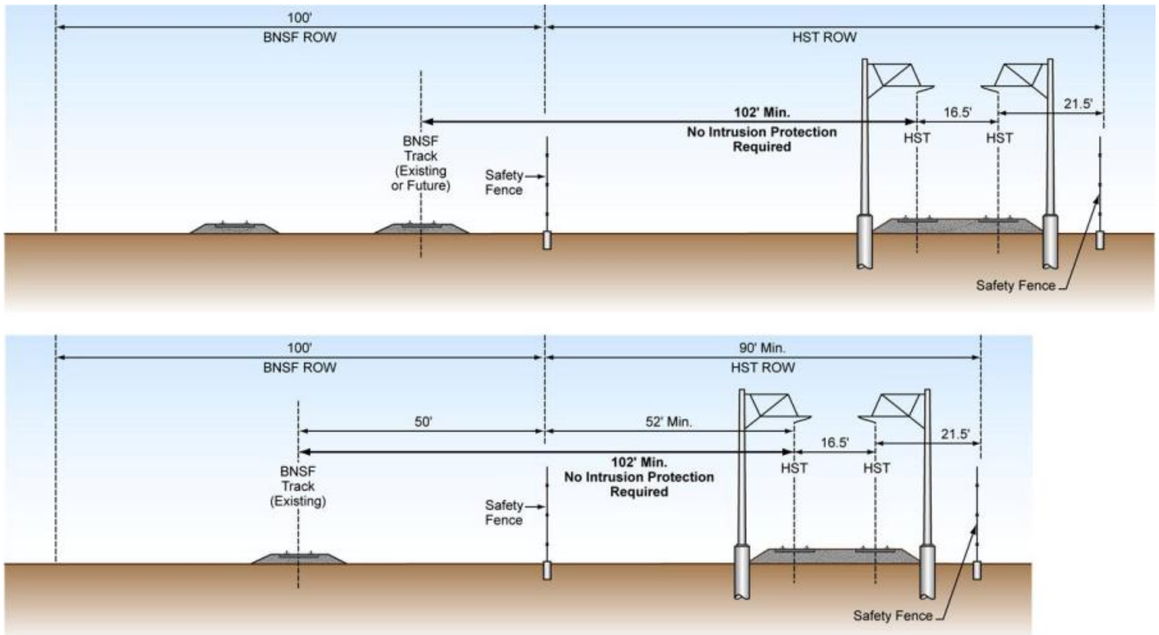
3.1.3 North-South Alignment

This section describes the BNSF Alternative as it traverses from north to south from Fresno to Bakersfield. Appendix 2-A of the project EIR/EIS provides additional detailed information of HST roadway crossings within these vicinities.

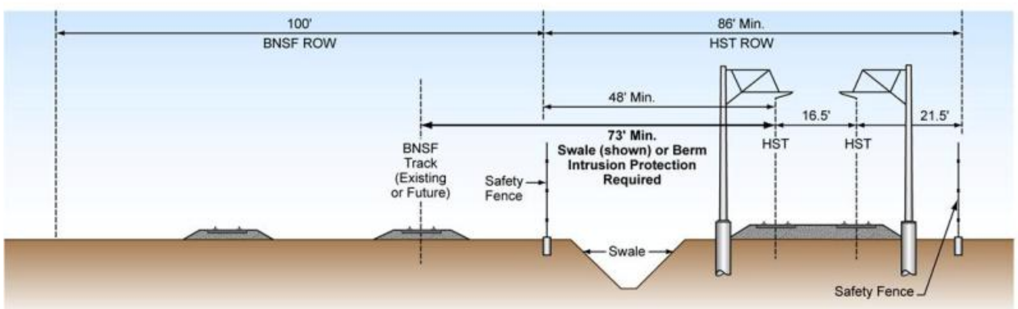
3.1.3.1 Fresno County

The BNSF Alternative would begin at the north end of the Fresno Station tracks adjacent to the western side of the UPRR right-of-way near Amador Street. The alignment would be below-grade as it crosses the Fresno Bee railroad spur, rendering the spur unusable. The alignment would return to grade and continue southeast through Fresno on the western side of the UPRR until reaching East Jensen Avenue. An intrusion protection barrier approximately 1 mile long would be required from approximately Stanislaus Street to Ventura Avenue because of the proximity of the UPRR and HST rights-of-way. The alignment would again be below-grade in a shallow trench as it travels underneath East Jensen Avenue and would then curve to the south and be elevated over Golden State Boulevard and SR 99. The elevated structure would span just over 1 mile and would reach a maximum height of approximately 55 feet to the top of the rail. The alignment would return to grade and join the BNSF Railway corridor on its western side at East Malaga Avenue south of Fresno.

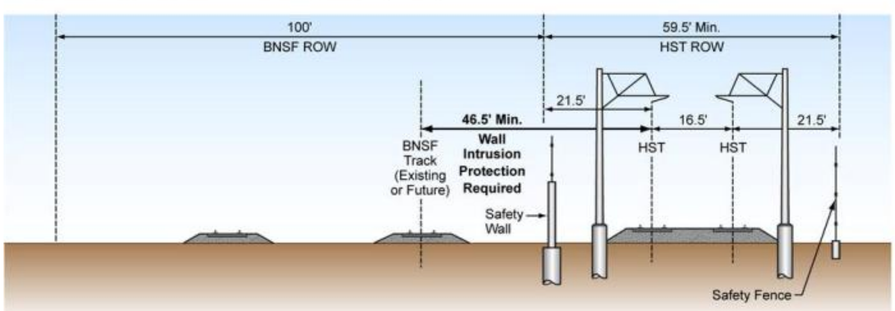
The BNSF Alternative would continue through Fresno County along the BNSF Railway right-of-way in an area consisting mostly of agricultural land. Approximately 24 miles of track would be in Fresno County. Nearly all of the alignment, roughly 20 of the 24 miles, would be at-grade.



(a) BNSF Centerline Track-to-Track Separation 102 Feet or More
(No Intrusion Protection Required)

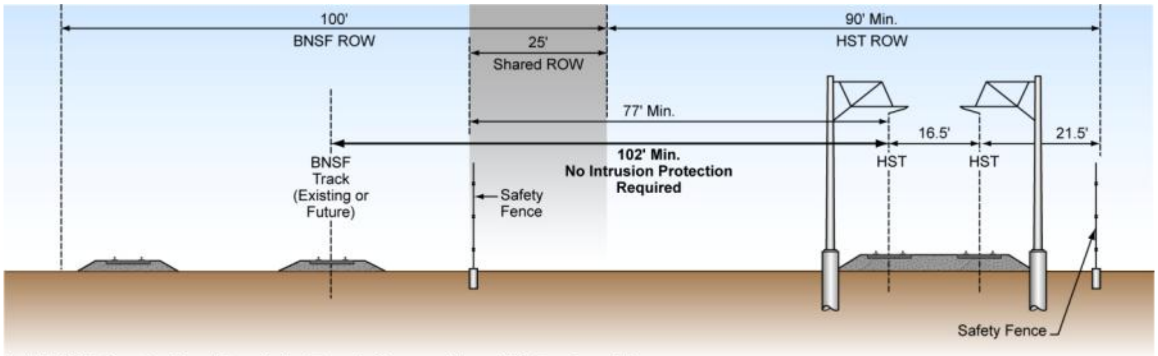


(b) BNSF Centerline Track-to-Track Separation 73 Feet to 102 Feet
(Swale or Berm Intrusion Protection Required)

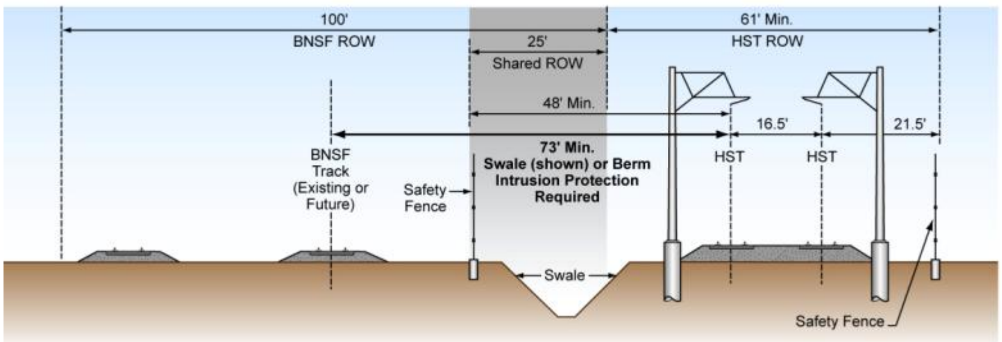


(c) BNSF Centerline Track-to-Track Separation 46.5 Feet (Min.) to 73 Feet
(Wall Intrusion Protection Required)

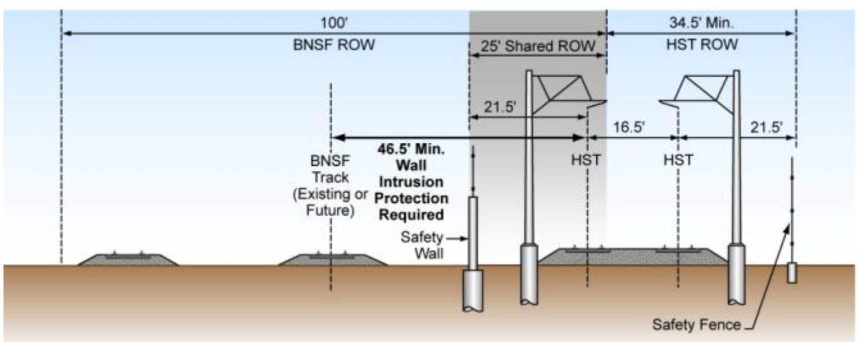
Figure 3-2
BNSF Alternative without shared right-of-way



(a) BNSF Centerline Track-to-Track Separation 102 Feet or More
(No Intrusion Protection Required)



(b) BNSF Centerline Track-to-Track Separation 73 Feet to 100 Feet
(Swale or Berm Intrusion Protection Required)



(c) BNSF Centerline Track-to-Track Separation 46.5 Feet (Min.) 73 Feet
(Wall Intrusion Protection Required)

Figure 3-3
BNSF Alternative showing opportunity for shared right-of-way

Approximately 5.5 miles of BNSF Railway tracks would be realigned, from approximately East Sumner Avenue to East Huntsman Avenue and from approximately East Rose Avenue to East Kamm Avenue, to accommodate the HST alignment. The alignment would be elevated where it crosses from the western side to the eastern side of the BNSF Railway tracks near East Conejo Avenue. The elevated structure would span approximately 1 mile and would reach a maximum height of approximately 42 feet to the top of the rail as it crosses over the BNSF Railway tracks. The BNSF Railway siding tracks would be reconstructed on the opposite side of the mainline tracks near South Peach Avenue. The HST alignment would be elevated over Cole Slough and the Kings River into Kings County. This elevated structure would clear the Cole Slough and Kings River levees by approximately 18 feet.

3.1.3.2 Kings County

Approximately 28 miles of the BNSF Alternative would be in Kings County. The alternative would pass east of the city of Hanford, parallel to and approximately 0.5 mile east of SR 43 (Avenue 8). South of Hanford near Idaho Avenue, the BNSF Alternative would curve to the west and then south toward the BNSF Railway right-of way. The alignment was refined in this area to avoid special aquatic features north of Corcoran and east of the BNSF Railway. The alignment would rejoin the BNSF Railway right-of-way on its western side just north of Corcoran and travel through the eastern edge of the city of Corcoran. The majority of this part of the alignment would pass through agricultural land except where it travels through Corcoran. The alignment in Corcoran encompasses a number of land uses, including residential, commercial, and industrial. Approximately 10 miles of track within Kings County would be elevated. In addition to the elevated structure that would travel over the Kings River complex, the alignment would be on elevated structure to the east of Hanford. The structure would span a length of 2.5 miles, beginning just south of Fargo Avenue and ending just north of Hanford-Armona Road. This portion of the alignment would pass over the San Joaquin Valley Railroad and SR 198. The structure would reach a height of approximately 50 feet to the top of the rail. The Kings/Tulare Regional Station–East Alternative would be located along this structure near the SR 43 and SR 198 interchange.

The alignment would continue at-grade south of Hanford-Armona Road for approximately 10 miles, where it would again ascend onto an elevated structure over Cross Creek and the BNSF Railway right-of-way. The structure would span a length of approximately 3 miles, beginning just before Cross Creek and returning to grade just before Nevada Avenue. The elevated structure would reach a maximum height of 40 feet to the top of the rail. The alignment would then continue at-grade and require an intrusion protection barrier from approximately Nevada Avenue to approximately North Avenue. The barrier would be approximately 2 miles long. At Patterson Avenue, the alignment would again ascend onto an elevated structure over Brokaw Avenue, Whitley Avenue, a BNSF Railway spur, and agricultural facilities located at the southern end of the city of Corcoran. The structure would span approximately 2 miles. The alignment would be constructed on a retained embankment as it crosses into Tulare County. Approximately 0.3 mile of BNSF Railway tracks would be realigned at Oregon Avenue, south of Corcoran.

Dedicated wildlife crossing structures would be provided from approximately Cross Creek south to the Tulare County line in at-grade portions of the railroad embankment at intervals of approximately 0.3 mile. Additionally, the BNSF Alternative would include dedicated wildlife crossing structures placed between 100 and 500 feet to the north and south of each of the following river/creek crossings: St. Johns Cut (Dutch Slough), Kings River, and Cross Creek.

3.1.3.3 Tulare County

The BNSF Alternative crosses approximately 22 miles of Tulare County. The alignment travels through the county adjacent to the western side of the BNSF Railway right-of-way. The majority of the alignment would be at-grade, with only a combined total of 4 miles elevated where the alignment crosses the Tule River and then both the Deer Creek and the Stoil railroad spur from the BNSF Railway. The elevated structure would reach a height of approximately 50 feet to the top of the rail. This alignment would cross over Lakeland Canal.

Dedicated wildlife crossing structures would be provided throughout at-grade portions of the railroad embankment at intervals of approximately 0.3 mile. Additionally, the BNSF Alternative would include dedicated wildlife crossing structures placed between 100 and 500 feet to the north and south of each of the following river/creek crossings: Tule River and Deer Creek.

3.1.3.4 Kern County

The Kern County segment of the BNSF Alternative is approximately 43 miles long and would pass through the cities of Wasco and Shafter on its way to Bakersfield. It would closely follow the western side of the BNSF Railway corridor until just south of Wasco, where it would cross over to the eastern side of the BNSF Railway tracks. Approximately 4 miles of BNSF Railway tracks would be realigned in the vicinity of Fourth Street, from Eighth Street to Poso Avenue, and from Jackson Avenue to Merced Avenue to accommodate the HST alignment. The alignment would continue on the eastern side of the BNSF Railway right-of-way through Shafter and then cross over once more to the western side of the BNSF Railway right-of-way. Approximately 8 miles of Santa Fe Way would be shifted to the west of the proposed HST alignment to accommodate the HST right-of-way, from north of Riverside Street to south of Renfro Road. Approximately 1.5 miles of the BNSF's Lone Star rail spur would be realigned from Riverside Street to south of Burbank Street. The alignment would generally follow the BNSF Railway corridor through Bakersfield to the project terminus in the vicinity of Baker Street. Approximately 2.5 miles of BNSF Railway tracks would be realigned in Bakersfield from Jomani Drive to Glenn Street and from Oak Street to C Street to accommodate the HST alignment. Within this portion of the alignment, approximately 25 miles would be at-grade, while the remainder of the alignment would be elevated. There would be four elevated sections along this segment of the BNSF Alternative. The alignment would be elevated over Poso Creek, as well as in the cities of Wasco, Shafter, and Bakersfield.

The first is a shorter span of elevated structure, extending just over 300 feet across Poso Creek. The second elevated section would cross over SR 46, pass through Wasco for a distance of about 3 miles, and return to grade in the vicinity of Kimberlina Road. It would reach a height of approximately 45 feet to the top of the rail. From approximately Kimberlina Road, the alignment would continue at-grade for approximately 5 miles to just north of Shafter Avenue where it would again ascend onto an elevated structure.

The alignment would be on an elevated structure through Shafter for a distance of about 4 miles between North Shafter Avenue and Cherry Avenue. This structure would pass over a BNSF Railway yard within the city and reach a maximum height of approximately 45 feet to the top of the rail. After returning to grade just south of Cherry Avenue, the alignment would travel approximately 10 miles to Country Breeze Place where it would ascend onto another elevated structure through Bakersfield.

From Country Breeze Place through the Bakersfield Station to Oswell Street, the BNSF Alternative would be on an elevated structure. The elevated structure through Bakersfield would pass over the transportation corridor improvement projects, SR 99, and a BNSF Railway yard. It would range in height from 50 to 90 feet to the top of the rail. The highest elevations in the city of Bakersfield would be reached between Rosedale Highway and SR 99. From SR 99 to the terminus of the BNSF Alternative, the structure would range in height from 50 to 70 feet to the top of the rail. In Bakersfield, the alignment would displace 4 religious facilities, the Bakersfield High School Industrial Arts building, the Mercado Latino Tianguis, and 123 homes in the eastern portion of the city. For more detail, see Section 3.12, Socioeconomics, Communities, and Environmental Justice.

Dedicated wildlife crossing structures would be provided in at-grade portions of the railroad embankment at intervals of approximately 0.3 mile. The BNSF Alternative would also include dedicated wildlife crossing structures placed between 100 and 500 feet to the north and south of the Poso Creek crossing. Dedicated wildlife crossing structures would not be required to the north and south of the Kern River because the BNSF Alternative would be elevated.

3.2 Corcoran Bypass Subsection

The Corcoran Bypass Subsection would diverge from the BNSF Alternative at Nevada Avenue and swing east of Corcoran, rejoining the BNSF Railway route at Avenue 136. The total length of the Corcoran Bypass would be approximately 10 miles. The alignment was refined in the area of Nevada Avenue to avoid special aquatic features and the Tulare Lakebed Mitigation Site north of Corcoran and east of the BNSF Railway. Similar to the corresponding section of the BNSF Alternative, the majority of the Corcoran Bypass Subsection would be at-grade. However, an elevated structure would carry the HST over SR 43, the BNSF Railway, and the Tule River. The structure would reach a maximum height of approximately 45 feet to the top of the rail. Dedicated wildlife crossing structures would be provided from approximately Cross Creek south to Avenue 136 in at-grade portions of the railroad embankment at intervals of approximately 0.3 mile. Dedicated wildlife crossing structures would also be placed between 100 and 500 feet to the north and south of each of the Cross Creek and Tule River crossings.

3.3 Allensworth Bypass Subsection

The Allensworth Bypass Subsection passes west of the BNSF Alternative, avoiding Allensworth Ecological Reserve and the Allensworth State Historic Park. As part of the Draft EIR/EIS process, this alignment was refined over the course of environmental studies, which included aerial photography reconnaissance and field surveys, to reduce impacts on wetlands and orchards. The total length of the Allensworth Bypass Subsection would be approximately 21 miles, beginning at Avenue 84 and rejoining the BNSF Alternative at Elmo Highway. The Allensworth Bypass Subsection would be constructed on an elevated structure where the alignment crosses Deer Creek and the Stoil railroad spur. The structure would reach a maximum height of approximately 47 feet to the top of the rail. The majority of the alignment would pass through Tulare County at-grade. Dedicated wildlife crossing structures would be provided from approximately Avenue 84 to Poso Creek at intervals of approximately 0.3 mile. Dedicated wildlife crossing structures would also be placed between 100 and 500 feet to the north and south of both the Deer Creek and Poso Creek crossings.

3.4 Bakersfield Hybrid Alternative

From Rosedale Highway (SR 58) in Bakersfield, the Bakersfield Hybrid Alternative follows the Bakersfield South Alternative as it parallels the BNSF Alternative at varying distances to the north. At approximately A Street, the Bakersfield Hybrid Alternative diverges from the Bakersfield South Alternative, crosses over Chester Avenue and the BNSF right-of-way in a southeasterly direction, then curves back to the northeast to parallel the BNSF Railway tracks towards Kern Junction. After crossing Truxtun Avenue, the alignment curves to the southeast to parallel the UPRR tracks and Edison Highway to its terminus at Oswell Street. As with the BNSF and Bakersfield South alternatives, the Bakersfield Hybrid Alternative would begin at-grade and become elevated starting at Country Breeze Place through Bakersfield to Oswell Street. The elevated section would range in height from 30 to 90 feet to the top of the rail. The realignment of BNSF Railway tracks from Jomani Drive to Glenn Street in Bakersfield would be required, as it would be for both the BNSF and Bakersfield South alternatives. Dedicated wildlife crossing structures would not be required because this alternative would be elevated to the north and south of the Kern River.

3.5 Kings/Tulare Regional Station–East Alternative Station

The Kings/Tulare Regional Station–East Alternative would be located east of SR 43 (Avenue 8) and north of the San Joaquin Valley Railroad on the BNSF Alternative (Figure 3-4). The station

building would be approximately 40,000 square feet with a maximum height of approximately 75 feet. The entire site would be approximately 25 acres, including 8 acres designated for the station, bus bays, short-term parking, and kiss-and-ride areas. An additional approximately 17.25 acres would support a surface parking lot with approximately 2,280 spaces. The balance of parking spaces necessary to meet the 2035 parking demand (2,800 total spaces) would be accommodated in Downtown Hanford, Visalia, and/or Tulare, with local transit or shuttle services connecting with the station. Reducing the number of parking spaces provided at the station would allow for more open-space areas, discourage growth at the station, encourage revitalization of the downtowns of Hanford, Visalia, and/or Tulare, and contain the development footprint of the station. Location of station parking in downtown areas would be identified in consultation with local communities to avoid traffic congestion and may require additional environmental review.

This station alternative is located just east of Hanford's primary sphere of influence but within the city's secondary sphere of influence. Station construction would include extension of sewer service to the station site from existing infrastructure at Lacey Boulevard. Water for the station may be provided by the City of Hanford from existing infrastructure at Lacey Boulevard or from groundwater wells installed for the station.

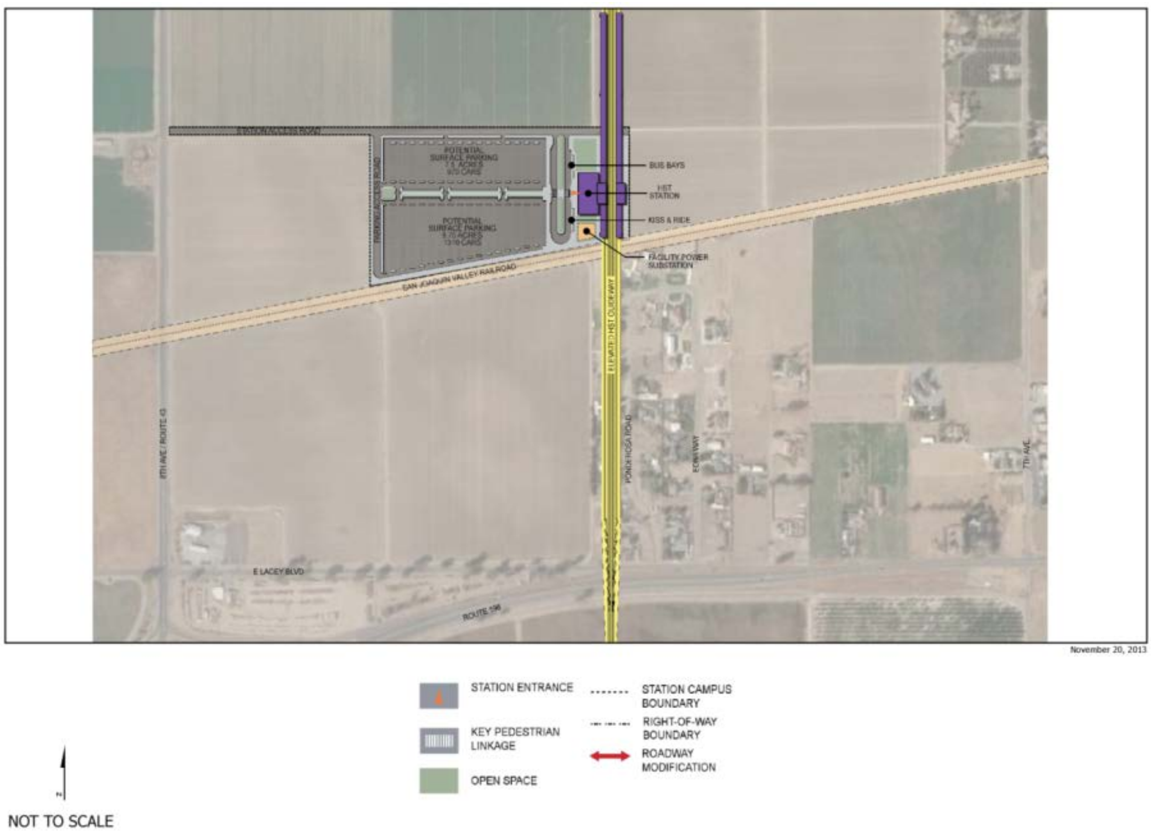


Figure 3-4
Kings/Tulare Regional Station–East Alternative

4.0 Operations and Service Plan

4.1 HST Service

The conceptual HST service plan for Phase 1, starting in 2020, begins with service between Anaheim/Los Angeles, and running north from there to the Central Valley, from Bakersfield to Merced, and then traveling northwest into the Bay Area. Subsequent stages of the HST System include a southern extension from Los Angeles to San Diego via the Inland Empire and an extension from Merced north to Sacramento, which are anticipated to be implemented in 2027 for purposes of this environmental analysis.

Train service would run in diverse patterns between various terminals. Three basic service types are envisioned:

- Express trains, which would serve major stations only, providing fast travel times: for example, between Los Angeles and San Francisco during the morning and afternoon peak, with a run time of 2 hours and 40 minutes.
- Limited-stop trains, which would skip selected stops along a route to provide faster service between stations.
- All-stop trains, which would focus on regional service.

The vast majority of trains would provide limited-stop services and offer a relatively fast run time along with connectivity between various intermediate stations. Numerous limited-stop patterns would be provided to achieve a balanced level of service at the intermediate stations. The service plan envisions at least four limited trains per hour in each direction, all day long, on the main route between San Francisco and Los Angeles. Each intermediate station in the Bay Area, Central Valley between Fresno and Bakersfield, Palmdale in the High Desert, and Sylmar and Burbank in the San Fernando Valley would be served by at least two limited trains every hour—offering at least two reasonably fast trains an hour to San Francisco and Los Angeles. Selected limited-stop trains would be extended south of Los Angeles, as appropriate, to serve projected demand.

Including the limited-stop trains on the routes between Sacramento and Los Angeles, and Los Angeles and San Diego, and the frequent-stop local trains between San Francisco and Los Angeles/Anaheim, and Sacramento and San Diego, every station on the HST network would be served by at least two trains per hour per direction throughout the day, and at least three trains per hour during the morning and afternoon peak periods. Stations with higher ridership demand would generally be served by more trains than those with lower estimated ridership demand.

The service plan provides direct-train service between most station pairs at least once per hour. Certain routes may not always be served directly, and some passengers would need to transfer from one train to another at an intermediate station, such as Los Angeles Union Station, to reach their final destination. Generally, the Phase 1 and Full-Build conceptual operations and service plans offer a wide spectrum of direct-service options and minimize the need for passengers to transfer.

Figure 4-1 shows how projected ridership and the numbers of trains would grow over time for the high scenario of ridership. In 2020, the assumed first year of Phase 1 operation, 120 trains would operate daily. This would grow to 260 daily trains in 2026, and jump to 288 when the full statewide HST System is anticipated to become operational, including the Merced to Sacramento and Los Angeles to San Diego sections. By 2035, 212 trainsets will be needed to operate 339 daily trains throughout the HST System.

RFP No.: 13-57 – Addendum No. 5 - 10/09/2014

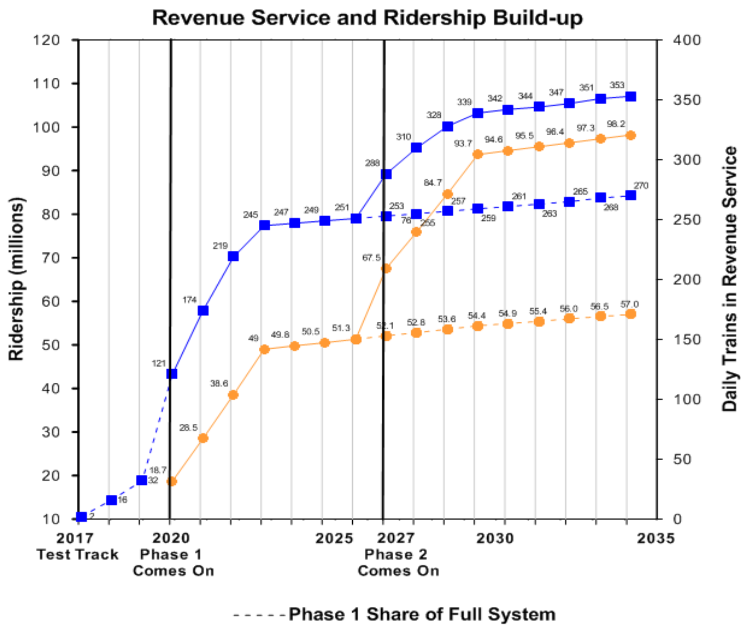


Figure 4-1
Revenue service and ridership build-up

Specifically for the Fresno to Bakersfield Section, estimated trip time would be approximately 40 minutes between Fresno and Bakersfield. The maximum operating speed would reach 220 mph in this section. Train service in the corridor is anticipated to run from around 6:00 a.m. to midnight. Non-service activities required to maintain the system are anticipated to occur during non-revenue service hours. The dwell time of trains for passenger unloading and loading is expected to be approximately 2 minutes at intermediate stations such as Fresno and Bakersfield. The dwell time for terminal stations in San Francisco, Sacramento, Merced, Los Angeles, Anaheim, and San Diego would be 30 to 40 minutes.

The Fresno, Kings/Tulare Regional, and Bakersfield stations would see a mix of stopping trains and through trains peaking for the full system. In 2035 for the high-ridership scenario, the full system would see four trains an hour stop at Fresno in each direction at the peak, and six trains run through. At the off-peak the same number of stops would be made, but the through trains would drop to three per hour. At the Kings/Tulare Regional Station, four trains would stop each hour per direction at the peak, with six running through. At the off-peak, four trains would stop at the station. At the Bakersfield Station, four trains would stop each hour per direction at the peak, with six running through. At the off-peak, four trains would stop in Bakersfield. For more detail, see Appendix 2-C, Operations and Service Plan Summary.

4.2 Maintenance Activities

The Authority would regularly perform maintenance along the track and railroad right-of-way as well as the power systems, train control, signalizing, communications, and other vital systems required for the safe operation of the HST System. Maintenance methods are expected to be similar to those of existing European and Asian HST systems, adapted to the specifics of the California HST. However, the FRA will specify standards of maintenance, inspection, and other items in a set of regulations (Rule of Particular Applicability or RPA) to be issued in the next several years, and the overseas practices may be amended in ways not currently foreseen. The

brief descriptions of maintenance activities described below are thus based on best judgment about future practices in California.

- Track and Right-of-Way – The track at any point would be inspected several times a week using measurement and recording equipment aboard special measuring trains. These trains are of similar design to the regular trains but would operate at a lower speed. They would run between midnight and 5 a.m. and would usually pass over any given section of track once in the night.

  Most adjustments to the track and routine maintenance would be accomplished in a single night at any specific location with crews and material brought by work trains along the line. When rail resurfacing is needed, perhaps several times a year, specialized equipment would pass over the track sections at 5–10 mph.

  Approximately every 4 to 5 years, ballasted track would require sections of more intensive maintenance of the track and structure using a train with a succession of specialized cars to raise, straighten, and tamp the track, and using vibrating “arms” to move and position the ballast under the ties. The train would typically cover a mile-long section of track in the course of one night’s maintenance. Slab track, which is expected to comprise track at elevated sections, would not require this activity. No major track components are expected to require replacement through 2035.

  Other maintenance of the right-of-way, aerial structures, and bridge sections of the alignment would include drain cleaning, vegetation control, litter removal, and other inspection that would typically occur monthly to several times a year.

- Power – The overhead contact system (OCS) along the right-of-way would be inspected nightly, with repairs being made when needed, which would typically be accomplished in one night’s maintenance window. Other inspections would occur monthly. Many of the functions and status of substations and smaller facilities outside of the trackway would be remotely monitored; however, visits would be made to repair or replace minor items, and would also be scheduled several times a month to check the general site. It is expected that no major component replacement would be required for the OCS or the substations through 2035.

- Structures – Visual inspections of the structures along the right-of-way and testing of fire and life-safety systems and equipment in or on structures would occur monthly, while inspections of all structures for structural integrity would occur at least annually. Steel structures would also require painting every several years. For tunnels and buildings, repair and replacement of lighting and communication components would be performed on a routine basis. It is expected that no major component replacement or reconstruction of any structures would be needed through 2035.

- Signaling, Train Control, and Communications – Inspection and maintenance of signaling and train control components would be guided by FRA regulations and standards to be adopted by the Authority. Typically, physical in-field inspection and testing of the system, using hand-operated tools and equipment, would occur four times a year. Communication components would be routinely inspected and maintained, usually at night, although daytime work may occur if the work area is clear of the trackway. No major component replacement of these systems is expected through 2035.

- Stations – Each station would be inspected and cleaned daily. Inspections of the structures, including the platforms, would occur annually. Inspections of other major systems, such as escalators, the heating and ventilation system, ticket-vending machines, and closed-circuit

television, would be according to manufacturer recommendations. Major station components are not expected to require replacement through 2035.

- Perimeter Fencing and Intrusion Protection – Fencing and intrusion protection systems will be remotely monitored, as well as periodically inspected. Maintenance would occur as needed, but the fencing or systems are not expected to require replacement before 2035.

Stormwater drainage infrastructure may also need to be maintained. Post-construction stormwater best management practices are discussed in Attachment 3 of the 401 application.

5.0 Construction Plan

This section summarizes the general approach to building the HST System, including activities associated with preconstruction and construction of major system components. To maintain its eligibility for federal American Recovery and Reinvestment Act (ARRA) funding, the Authority intends to begin final design and project construction in early 2013. The Initial Operating Section (IOS) first construction is to be completed by December 2018. Service on the IOS is expected to start in 2022.

The Fresno to Bakersfield Section would be built using a “design/build” (D/B) approach. This method of project delivery involves a single contract with the project owner to provide design and construction services. This differs from the “design/bid/build” approach, where design and construction services are managed under separate contracts and the design is completed before the project is put out for construction bids. The D/B approach offers more flexibility to adapt the project to changing conditions. The contract with the D/B contractor will require compliance with standard engineering design and environmental practices and regulations as well as implementation of any project design features and applicable mitigation measures included in the project EIR/EIS.

The Authority has prioritized a portion of the Merced to Fresno and the Fresno to Bakersfield project sections as the first section of the California HST System to be built to meet the ARRA funding requirements, which includes both a funding deadline of September 30, 2017, and the requirement that the federal investment demonstrate “independent utility” as that term is defined in the High Speed Intercity Passenger Rail Notice of Funding Availability and Interim Program Guidance (74 F.R. 29900, 29905, June 23, 2009). The IOS first construction will be available for immediate use for improved and faster service on the San Joaquin intercity line prior to the initiation of HST service on the IOS in 2022, thus providing for independent utility consistent with ARRA. The Central Valley was determined to be the best location for the initial construction, with service extending south to Palmdale and the San Fernando Valley and north to San Jose to link with blended service to Metrolink in the south and Caltrain in the north. The Authority has met the “independent utility” requirement of the federal stimulus financing because the IOS first construction track would have dedicated passenger track capable of higher speeds, thereby improving existing San Joaquin operations. It would also include a basic station design (platform) for nonelectrified passenger service in Fresno (located at the planned Fresno Station).

The interim use of the IOS first construction track for upgraded San Joaquin service could have environmental impacts that differ from those analyzed in the project EIR/EIS: for example, increased noise and air quality impacts because of the increased frequency of diesel trains during the temporary period when San Joaquin service would use the IOS first construction track (between 2018 and 2022). Service upgrades for the San Joaquin service and the potential for environmental impact would be assessed by the operating agency before service initiation.

5.1 General Approach

Upon receiving the required environmental approvals and securing needed funding, the Authority would begin implementing its construction plan. Given the size and complexity of the HST project, the design and construction work could be divided into a number of procurement packages. In general, the procurement would address the following:

- Civil/structural infrastructure, including design and construction of passenger stations, maintenance facilities, and right-of-way facilities.
- Trackwork, including design and construction of direct fixation track and sub-ballast, ballast, ties and rail installation, switches, and special trackwork.
- Core systems, such as traction power, train controls, communications, the operations center, and the procurement of rolling stock.

One or more D/B packages would be developed and the Authority would then issue construction requests for proposals (RFPs), begin right-of-way acquisition, and procure construction management services to oversee physical construction of the project. During peak construction periods, work is envisioned to be underway at several locations along the route, with overlapping construction of various project elements. Working hours and workers present at any time would vary depending on the activities being performed. Where construction fencing is required, it would be restricted to areas designated for construction staging and areas where public safety is an issue. No fencing would be used across the Kern River. Though the D/B contractor will set the actual schedule, the approximate schedule for construction is provided in Table 5-1 as follows:

Table 5-1
Approximate Construction Schedule[a, b]

Activity	Tasks	Duration
Right-of-way Acquisition	Proceed with right-of-way acquisitions once the state legislature appropriates funds in annual budget	March 2013–March 2015
Survey and Preconstruction	Locate utilities, establish right-of-way and project control points and centerlines, establish or relocate survey monuments	March 2013–October 2013
Mobilization	Safety devices and special construction equipment mobilization	April 2014–July 2014
Site Preparation	Utilities relocation; clearing/grubbing right-of-way; establishment of detours and haul routes; preparation of construction equipment yards, stockpile materials, and precast concrete segment casting yard	July 2014–November 2014 (two site preparation periods)
Earth Moving	Excavation and earth support structures	November 2014–November 2016
Construction of Road Crossings	Surface street modifications, grade separations	November 2014–November 2016
Construction of Aerial Structures	Aerial structure and bridge foundations, substructure, and superstructure	November 2014–January 2017
Track Laying	Includes backfilling operations and drainage facilities	November 2016–July 2017

RFP No.: 13-57 – Addendum No. 5 - 10/09/2014

Table 5-1
Approximate Construction Schedule[a, b]

Activity	Tasks	Duration
Systems	Train control systems, overhead contact system, communication system, signaling equipment	November 2016–May 2019
Demobilization	Includes site cleanup	October 2016–April 2017 (two demobilization periods)
Maintenance-of-Way Facility	Potentially collocated with HMF[a,c]	May 2017–November 2018
HST Stations	Demolition, site preparation, foundations, structural frame, electrical and mechanical systems, finishes	Fresno: June 2017–April 2020 Kings/Tulare Regional: June 2020–June 2023[d] Bakersfield: June 2018–April 2021

Notes:
[a] Based on a two-phase implementation of the project: first construction will meet the ARRA funding deadline and be completed in 2017; the remainder of the Initial Operating Segment will be completed by 2022 per the Business Plan and based on anticipated funding flow.
[b] Final design will be completed by the design/build contractor following contract award and issuance of the Notice to Proceed for each construction package.
[c] HMF would be sited in either the Merced to Fresno or Fresno to Bakersfield Section.
[d] Right-of-way would be acquired for the Kings/Tulare Regional Station; however, the station itself would not be part of initial construction.

Acronyms:
ARRA = American Recovery and Reinvestment Act
HMF = heavy maintenance facility
HST = high-speed train
TBD = to be determined

Consistent with the Memorandum of Understanding for Achieving an Environmentally Sustainable High-Speed Train System in California (Authority et al. 2011), the Authority intends to build the project using sustainable methods that:

- Minimize the use of nonrenewable resources.
- Minimize the impacts on the natural environment.
- Protect environmental diversity.
- Emphasize using renewable resources in a sustainable manner. An example of this approach would be the use of material recycling for project construction (e.g., asphalt, concrete, or Portland Cement Concrete [PCC], excavated soil).

Fill material would be excavated from local borrow sites and travel by truck from 10 to 40 miles to the Preferred Alignment. Railroad ballast would be drawn from existing, permitted quarries located from the Bay Area to Southern California. Ballast would be delivered by a combination of rail and trucks. All materials would be suitable for construction purposes and free from toxic pollutants in toxic amounts in accordance with Section 307 of the Clean Water Act.

Applicable design standards are included in Appendix 2-D of the project EIR/EIS.

5.2 Preconstruction Activities

During final design, the Authority and its contractor would conduct a number of preconstruction activities to determine how best actual construction should be staged and managed. These activities include the following:

- Conducting geotechnical investigations, which would focus on defining precise geology, groundwater, seismic, and environmental conditions along the alignment. The results of this work would guide final design and construction methods for foundations, underground structures, tunnels, stations, grade crossings, aerial structures, systems, and substations.
- Identifying staging areas and precasting yards, which would be needed for the casting, storage, and preparation of precast concrete segments, temporary spoil storage, workshops, and the temporary storage of delivered construction materials. Field offices and/or temporary jobsite trailers would also be located at the staging areas. Following construction, staging and laydown areas would be restored to previous condition.
- Initiating site preparation and demolition, such as clearing, grubbing, and grading, followed by the mobilization of equipment and materials. Demolition would require strict controls to ensure that adjacent buildings or infrastructure are not damaged or otherwise affected by the demolition efforts.
- Relocating utilities, where the contractor would work with the utility companies to relocate or protect in-place high-risk utilities, such as overhead tension wires, pressurized transmission mains, oil lines, fiber optics, and communications, before construction.
- Implementing temporary, long-term, and permanent road closures to re-route or detour traffic away from construction activities. Handrails, fences, and walkways would be provided for the safety of pedestrians and bicyclists.
- Locating temporary batch plants, which would be required to produce PCC or asphaltic concrete (AC) needed for roads, bridges, aerial structures, retaining walls, and other large structures. The facilities generally consist of silos containing fly ash, lime, and cement; heated tanks of liquid asphalt; sand and gravel material storage areas; mixing equipment; aboveground storage tanks; and designated areas for sand and gravel truck unloading, concrete truck loading, and concrete truck washout. The contractor would be responsible for implementing procedures for reducing air emissions, mitigating noise impacts, and reducing the discharge of potential pollutants into storage drains or watercourses from the use of equipment, materials, and waste products.
- Conducting other studies and investigations, such as local business surveys, as needed, to identify business usage, delivery, shipping patterns, and critical times of the day or year for business activities. This information would help develop construction requirements and worksite traffic control plans, and will identify potential alternative routes, cultural resource investigations, and historic property surveys.

5.3 Major Construction Activities

Four major types of construction activities are briefly described below. Because there is no tunnel construction proposed for the Fresno to Bakersfield HST Section, this construction element is not discussed.

5.3.1 Earthwork

Earth support is an important factor in constructing the deep excavations that will be encountered on several alignment sections. It is anticipated that the following excavation support systems may be used along the route. There are three general excavation support categories, which are described below.

- Open-Cut Slope. Open-cut slope is used in areas where sufficient room is available to open-cut the area and slope the sides back to meet the adjacent existing ground. The slopes are designed similar to any cut slope, taking into account the natural repose angle of adjacent ground material and global stability.
- Temporary. Temporary excavation support structures are designed and installed to support vertical or near-vertical faces of the excavation in areas where room to open-cut does not exist. This structure does not contribute to the final load-carrying capacity of the tunnel or trench structure and is either abandoned in place or dismantled as the excavation is being backfilled. Generally, it consists of soldier piles and lagging, sheet pile walls, slurry walls, secant piles, or tangent piles.
- Permanent. Permanent structures are designed and installed to support vertical or near vertical faces of the excavation in areas where room to open-cut does not exist. This structure forms part of the permanent final structure. Generally it consists of slurry walls, secant piles, or tangent pile walls.

5.3.2 Bridge, Aerial Structure, and Road-Crossing Construction

Similar to existing high-speed rail systems around the world, the elevated guideways are expected to be designed and built as single box segmental girder construction. Where needed, other structural types will be considered and used, including steel girders, steel truss, and cable-supported structures.

- Foundations. A typical aerial structure foundation pile cap is supported by an average of 4 large-diameter bored piles with diameters ranging from 5 to 9 feet. Depth of piles depends on geotechnical site conditions. Pile construction can be achieved by using rotary drilling rigs, and either bentonite slurry or temporary casings may be used to stabilize pile shaft excavation. The estimated pile production rate is 4 days per pile installation. Additional pile installation methods available to the contractor include bored piles, rotary drilling cast-in-place piles, driven piles, and a combination of pile jetting and driving.

  Upon completing the piles, pile caps can be constructed using conventional methods. For pile caps constructed near existing structures, such as railways, bridges, and underground drainage culverts, temporary sheet piling (i.e., temporary walls) can be used to minimize disturbances to adjacent structures. It is anticipated that sheet piling installation and extraction would be achieved using hydraulic sheet piling machines.
- Substructure. Aerial structures with pier heights ranging from 20 to 90 feet may be constructed using conventional jump form and scaffolding methods. A self-climbing formwork system may be used to construct piers and portal beams over 90 feet high. The self-climbing formwork system is equipped with a winched lifting device, which is raised up along the column by hydraulic means with a structural frame mounted on top of the previous pour. In general, a 3-day cycle for each 12-feet pour height can be achieved. The final size and spacing of the piers depends on the type of superstructure and spans they are supporting.

- Superstructure. It will be necessary to consider the loadings, stresses, and deflections encountered during the various intermediate construction stages, including changes in static scheme, sequence of tendon installation, maturity of concrete at loading, and load effects from erection equipment. As a result, the final design will depend on the contractor's means and methods of construction and can include several different methods, such as a span-by-span, incrementally launched, progressive cantilever, and balanced cantilever.

  Road crossings of existing railroads, roads, and the HST would be constructed on the line of the existing road or offline at some locations. When constructed online, the existing road would be closed or temporarily diverted. When constructed offline, the existing road would be maintained in use until the new crossing is completed. Where new roadway undercrossings of existing railroads are required, a temporary shoofly track would be constructed to maintain railroad operations during undercrossing construction.

  Construction of the foundations and substructure would be similar to that for the aerial structures but reduced in size. The superstructure would likely be constructed using precast, prestressed concrete girders and cast-in-place deck. Approaches to the bridges would be earthwork embankments, mechanically stabilized earth wall, or other retaining structures.

5.3.3 Railroad Systems Construction

The railroad systems are to include trackwork, traction electrification, signaling, and communications. After completion of earthwork and structures, trackwork is the first rail system to be constructed, and it must be in place, at least locally, to start traction electrification and railroad signalizing installation. Trackwork construction generally requires the welding of transportable lengths of steel running onto longer lengths (approximately 0.25 mile), which are placed in position on cross ties or track slabs and field-welded into continuous lengths from special trackwork to special trackwork.

Both tie and ballast as well as slab track construction would be used. Tie and ballast construction, which would be used for at-grade and minor structures, typically uses cross ties and ballast that are distributed along the trackbed by truck or tractor. In sensitive areas (e.g., where the HST is parallel to or near streams, rivers, or wetlands, and in areas of limited accessibility), this operation may be accomplished by using the established right-of-way with material delivery via the constructed rail line. For major civil structures, slab track construction would be used. Slab track construction is a non-ballasted track form employing precast track supports.

Traction electrification equipment to be installed includes traction power substations and the overhead contact system. Traction power substations are typically fabricated and tested in a factory, then delivered by tractor-trailer to a prepared site adjacent to the alignment. It is assumed that substations are to be located every 30 miles along the alignment. The overhead contact system is assembled in-place over each track and includes poles, brackets, insulators, conductors, and other hardware.

Signaling equipment to be installed includes wayside cabinets and bungalows, wayside signals (at interlocking), switch machines, insulated joints, impedance bounds, and connecting cables. The equipment will support automatic train protection, automatic train control, and positive train control to control train separation, routing at interlocking, and speed.

5.3.4 Station Construction

Because HST stations for the Fresno to Bakersfield Section would be newly constructed, existing train operations, including station capacity and passenger levels of service, would be maintained during construction. HST stations require significant coordination and planning to accommodate

safe and convenient access to existing businesses and residences and to accommodate traffic control during construction periods. The typical construction sequence would be:

- Demolition and Site Preparation. The contractor would be required to construct detour roadways, new station entrances, construction fences and barriers, and other elements required as a result of taking existing facilities on the worksite out of service. The contractor would be required to perform street improvement work, site clearing and earthwork, drainage work, and utility relocations. Additionally, substations and maintenance facilities are assumed to be newly constructed structures. For platform improvements or additional platform construction, the contractor may be required to realign existing track.

- Structural Shell and Mechanical/Electrical Rough-ins. For these activities, the contractor would construct foundations and erect the structural frame for the new station, enclose the new building, and/or construct new platforms and connect the structure to site utilities. Additionally, the contractor would rough-in electrical and mechanical systems and install specialty items such as elevators, escalators, and ticketing equipment.

- Finishes and Tenant Improvements. The contractor would install electrical and mechanical equipment, communications and security equipment, finishes, and signage. Additionally, the contractor may install other tenant improvements if requested.

6.0 References

Bremner-Harrison et al. 2007. Use of Highway Crossing Structures by Kit Foxes. Prepared for the California Department of Transportation. August 2007.

California High-Speed Rail Authority (Authority). 2008. Technical Memorandum: High-Speed Train Station Platform Geometric Design, TM 2.2.4. Prepared by Parsons Brinckerhoff. Sacramento, CA: California High-Speed Rail Authority, May 16, 2008.

———. 2009. Technical Memorandum: Station Program Design Guidelines, TM 2.2.2. Prepared by Parsons Brinckerhoff. Sacramento, CA, California High-Speed Rail Authority, April 10, 2009.

California High-Speed Rail Authority and Federal Railroad Administration (Authority and FRA). 2014. Final Environmental Impact Report/ Environmental Impact Statement (EIR/EIS) for the Fresno to Bakersfield Section of the California High-Speed Train (HST) Project. Sacramento, CA, and Washington, DC. (in progress).

California High-Speed Rail Authority, Federal Railroad Administration, U.S. Department of Housing and Urban Development, Federal Transit Administration, and U.S. Environmental Protection Agency (Authority et al.). 2011. MOU for Achieving an Environmentally Sustainable High-Speed Train System in California.

California High-Speed Rail Authority, U.S. Department of Transportation, Federal Railroad Administration, U.S. Environmental Protection Agency, and U.S. Army Corps of Engineers (Authority et al.). 2010. National Environmental Policy Act/Section 404/408 Integration Process Memorandum of Understanding. Sacramento, CA. November 2010.

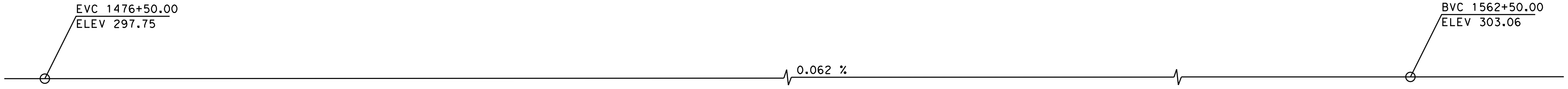
Navigant Consulting, Inc. 2008. The Use of Renewable Energy Sources to Provide Power to California's High Speed Rail. Prepared for the California High-Speed Rail Authority. Rancho Cordova, CA: Navigant Consulting, September 3, 2008.

Sulouff, D.H. 2011. Chief, Bridge Section, U.S. Coast Guard Island, Alameda, California. Memorandum regarding California High-Speed Rail Project, Merced to Bakersfield

Section. Alameda, CA, to US Department of Transportation, and Federal Railroad Administration, Attention David Valenstein. June 21, 2011.

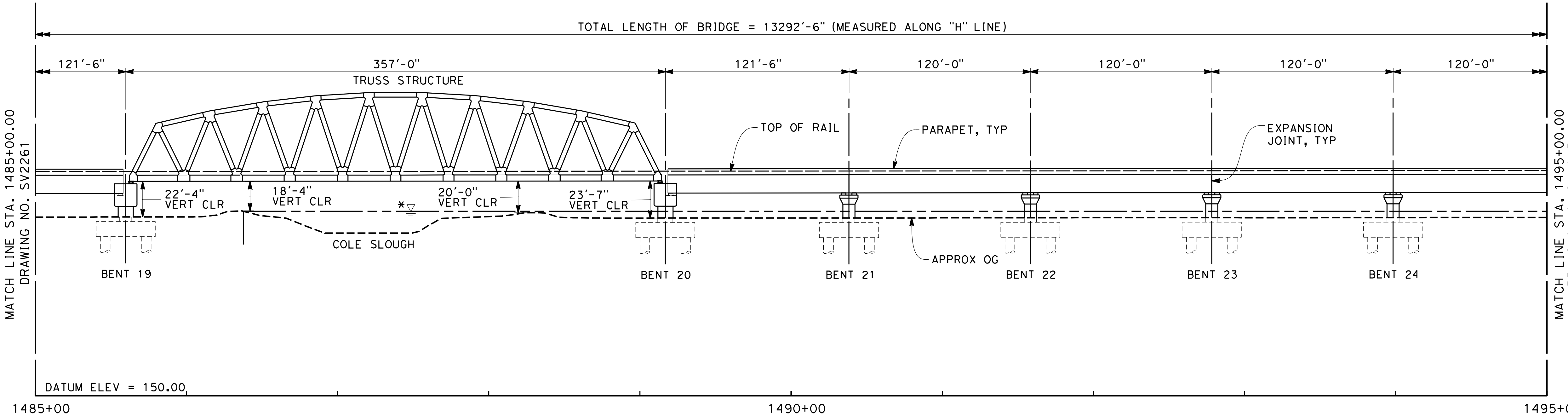
Attachment 2

Design Drawings and Typical Cross-Sections



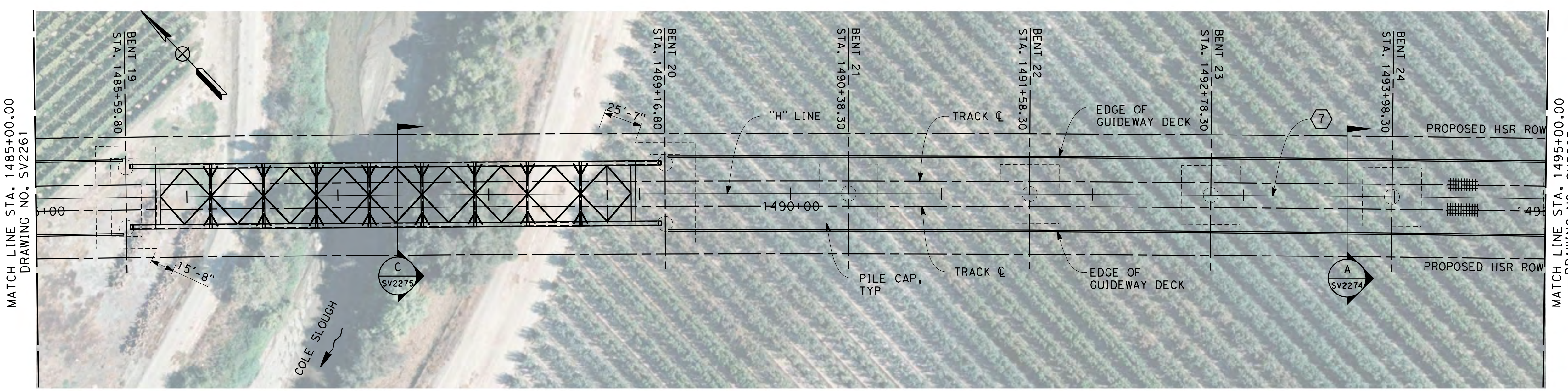
TOP OF RAIL "H" LINE

NO SCALE



ELEVATION

SCALE 1" = 40'



PLAN

SCALE 1" = 40'

NOTES

1. NOT ALL PILES SHOWN
2. PILE LENGTH TO BE DETERMINED
3. SUPERSTRUCTURE CONSTRUCTION, UON
   - SIMPLE SPANS - MSS OR FLPM
   - CONTINUOUS SPANS - BCC - PRECAST IN-SITU
   - STEEL TRUSS - INSITU, SLID OR LAUNCHED
   - ELEVATED SLABS - PC BEAM AND INSITU SLAB
4. UTILITY LOCATIONS TO BE DETERMINED
5. ACCESS STAIRWAYS ARE PROVIDED AT SYSTEMS SITES (APPROX. 2.5 MILE INTERVALS). LADDER ACCESS TO VIADUCTS IS PROVIDED AT 2500 FT INTERVALS WITH ACCESS ROAD AND TURNING CIRCLE WHERE NECESSARY.

LEGEND:

(1) STRUCTURE APPROACH SLAB

(2) RETAINING WALL

* ESTIMATED 100-YEAR FLOOD ELEVATION, SEE "FRESNO TO BAKERSFIELD CORRIDOR HYDROLOGY, HYDRAULICS AND DRAINAGE 15% DRAFT REPORT".

CURVE DATA

(7)

R = 36500.00'
Δ = 58° 05' 38.8"
T = 20271.5'
L = 37008.6'

40 0 40 80
1"=40'

REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY M. FISHER
DRAWN BY D. ORIZA
CHECKED BY A. ARMSTRONG
IN CHARGE R. COFFIN
DATE 12/31/13

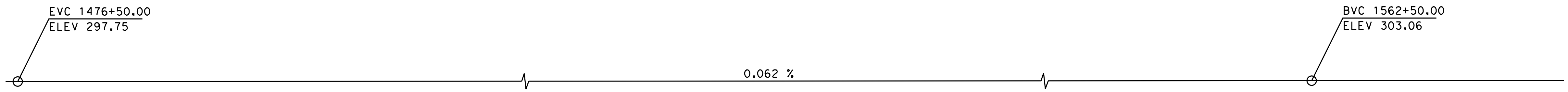
RECORD SET 15% DESIGN SUBMISSION - NOT FOR CONSTRUCTION

URS | HMM | ARUP
California High-Speed Train

CALIFORNIA HIGH-SPEED RAIL AUTHORITY

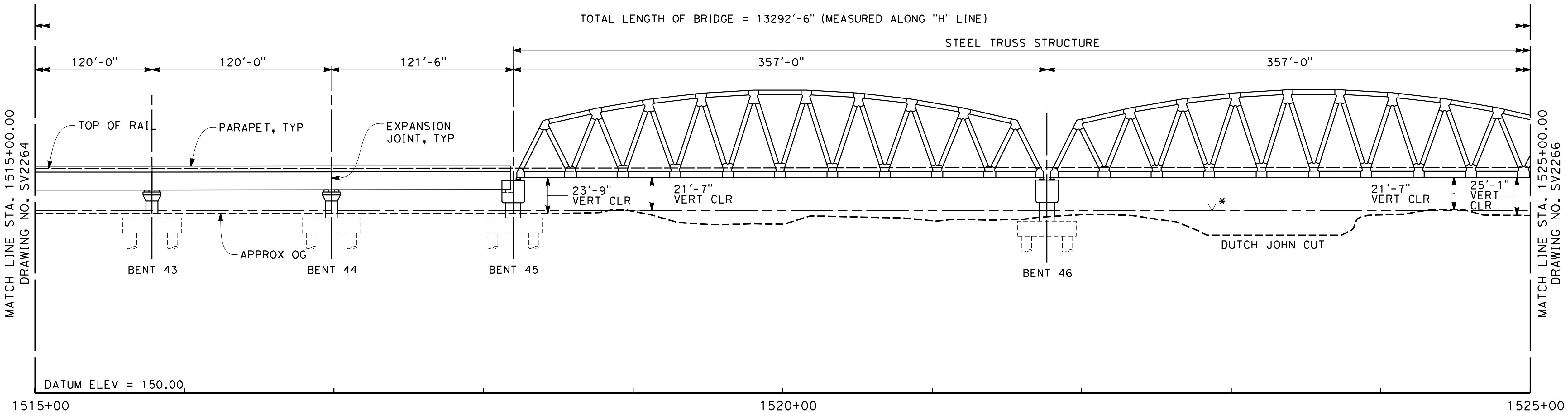
CALIFORNIA HIGH-SPEED TRAIN PROJECT
FRESNO TO BAKERSFIELD
HANFORD SUBSECTION
ALIGNMENT H
KINGS RIVER VIADUCT
PLAN AND ELEVATION

CONTRACT NO. HSR 06-0003
DRAWING NO. SV2262
SCALE AS SHOWN
SHEET NO. 5 OF 18



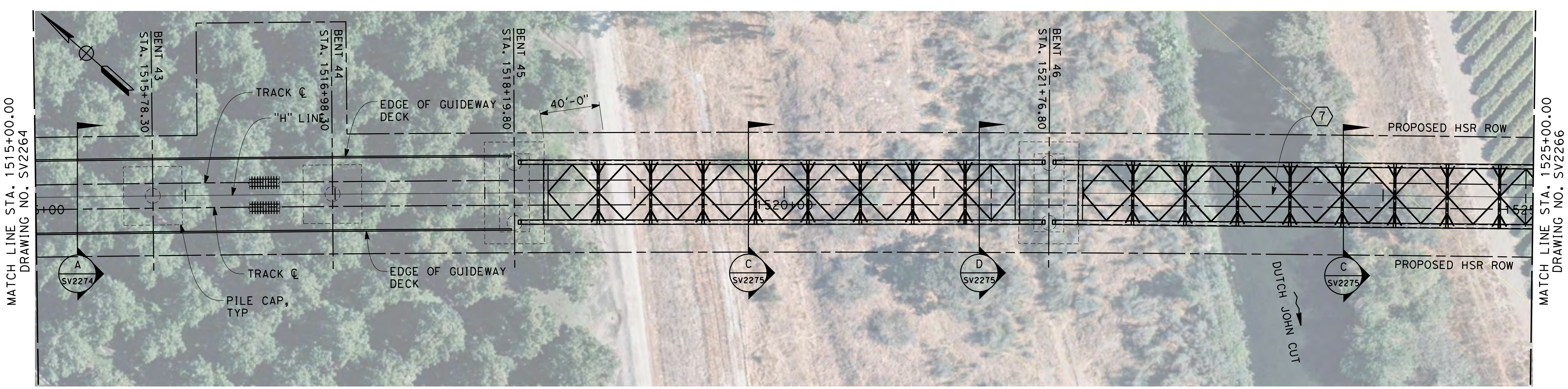
TOP OF RAIL "H" LINE

NO SCALE



ELEVATION

SCALE 1" = 40'



PLAN

SCALE 1" = 40'

NOTES

1. NOT ALL PILES SHOWN
2. PILE LENGTH TO BE DETERMINED
3. SUPERSTRUCTURE CONSTRUCTION, UON
   - SIMPLE SPANS - MSS OR FLPM
   - CONTINUOUS SPANS - BCC - PRECAST IN-SITU
   - STEEL TRUSS - INSITU, SLID OR LAUNCHED
   - ELEVATED SLABS - PC BEAM AND INSITU SLAB
4. UTILITY LOCATIONS TO BE DETERMINED
5. ACCESS STAIRWAYS ARE PROVIDED AT SYSTEMS SITES (APPROX. 2.5 MILE INTERVALS). LADDER ACCESS TO VIADUCTS IS PROVIDED AT 2500 FT INTERVALS WITH ACCESS ROAD AND TURNING CIRCLE WHERE NECESSARY.

LEGEND:

1 STRUCTURE APPROACH SLAB

2 RETAINING WALL

* ESTIMATED 100-YEAR FLOOD ELEVATION, SEE "FRESNO TO BAKERSFIELD CORRIDOR HYDROLOGY, HYDRAULICS AND DRAINAGE 15% DRAFT REPORT".

CURVE DATA

7

R = 36500.00'
Δ = 58° 05' 38.8"
T = 20271.5'
L = 37008.6'

40 0 40 80
1"=40'

RFP No.: 13-57 – Addendum No. 5 - 10/09/2014

frank.palermo 12/23/2013 2:40:44 PM c:\pwworking\hmm\external\frank.palermo\frank.palermo01-arup.com\d0128411\FB-SV-2265-H.dgn

REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY M. FISHER
DRAWN BY F. PALERMO
CHECKED BY A. ARMSTRONG
IN CHARGE R. COFFIN
DATE 12/31/13

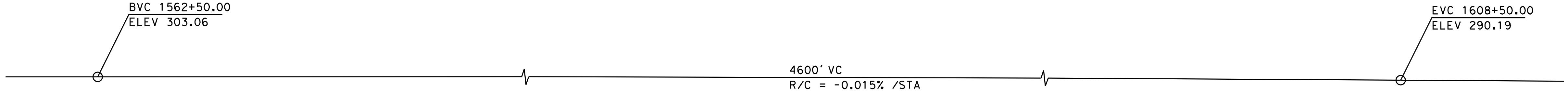
RECORD SET 15% DESIGN SUBMISSION - NOT FOR CONSTRUCTION

URS | HMM | ARUP
California High-Speed Train

CALIFORNIA HIGH-SPEED RAIL AUTHORITY

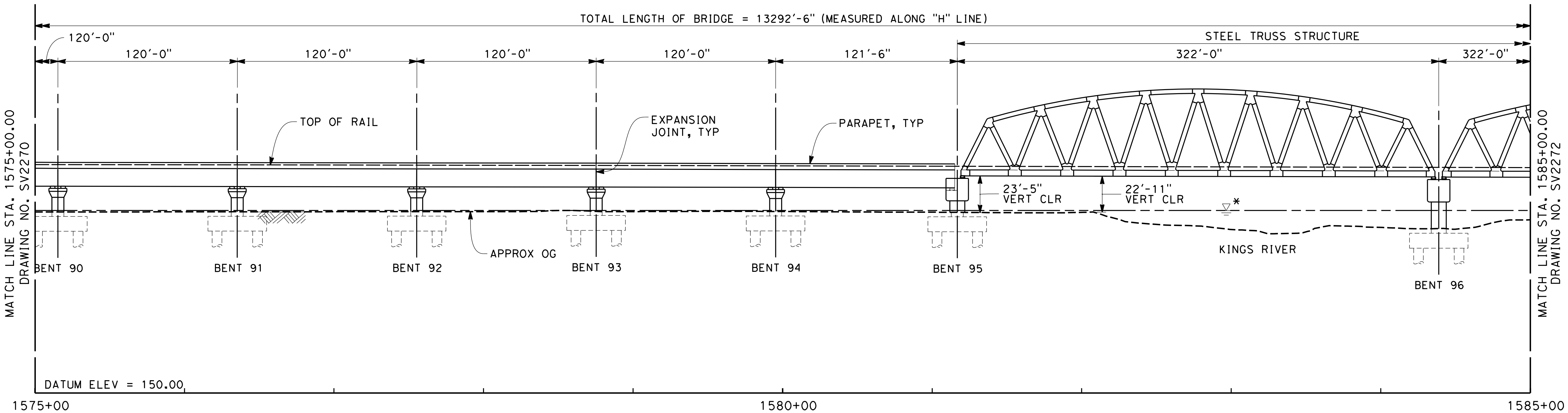
CALIFORNIA HIGH-SPEED TRAIN PROJECT
FRESNO TO BAKERSFIELD
HANFORD SUBSECTION
ALIGNMENT H
KINGS RIVER VIADUCT
PLAN AND ELEVATION

CONTRACT NO. HSR 06-0003
DRAWING NO. SV2265
SCALE AS SHOWN
SHEET NO. 8 OF 18



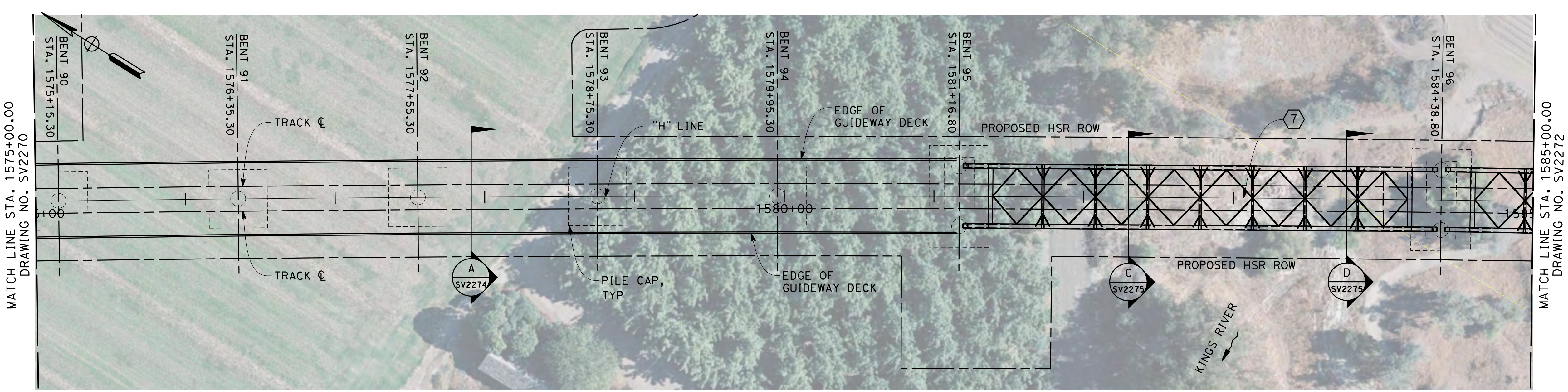
TOP OF RAIL "H" LINE

NO SCALE



ELEVATION

SCALE 1" = 40'



PLAN

SCALE 1" = 40'

NOTES

1. NOT ALL PILES SHOWN
2. PILE LENGTH TO BE DETERMINED
3. SUPERSTRUCTURE CONSTRUCTION, UON

SIMPLE SPANS	- MSS OR FLPM
CONTINUOUS SPANS	- BCC - PRECAST IN-SITU
STEEL TRUSS	- INSITU, SLID OR LAUNCHED
ELEVATED SLABS	- PC BEAM AND INSITU SLAB

4. UTILITY LOCATIONS TO BE DETERMINED
5. ACCESS STAIRWAYS ARE PROVIDED AT SYSTEMS SITES (APPROX. 2.5 MILE INTERVALS). LADDER ACCESS TO VIADUCTS IS PROVIDED AT 2500 FT INTERVALS WITH ACCESS ROAD AND TURNING CIRCLE WHERE NECESSARY.

LEGEND:

1 STRUCTURE APPROACH SLAB

2 RETAINING WALL

* ESTIMATED 100-YEAR FLOOD ELEVATION, SEE "FRESNO TO BAKERSFIELD CORRIDOR HYDROLOGY, HYDRAULICS AND DRAINAGE 15% DRAFT REPORT".

CURVE DATA

7

R = 36500.00'
Δ = 58° 05' 38.8"
T = 20271.5'
L = 37008.6'

40 0 40 80
1"=40'

REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY M. FISHER
DRAWN BY F. PALERMO
CHECKED BY A. ARMSTRONG
IN CHARGE R. COFFIN
DATE 12/31/13

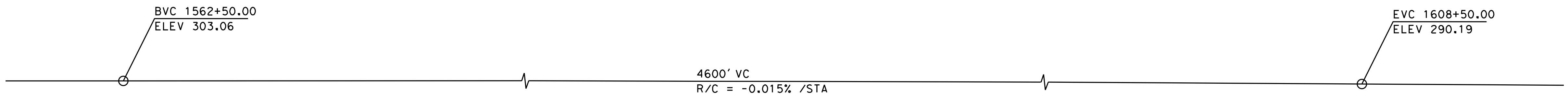
RECORD SET 15% DESIGN SUBMISSION - NOT FOR CONSTRUCTION

URS | HMM | ARUP — California High-Speed Train

CALIFORNIA HIGH-SPEED RAIL AUTHORITY

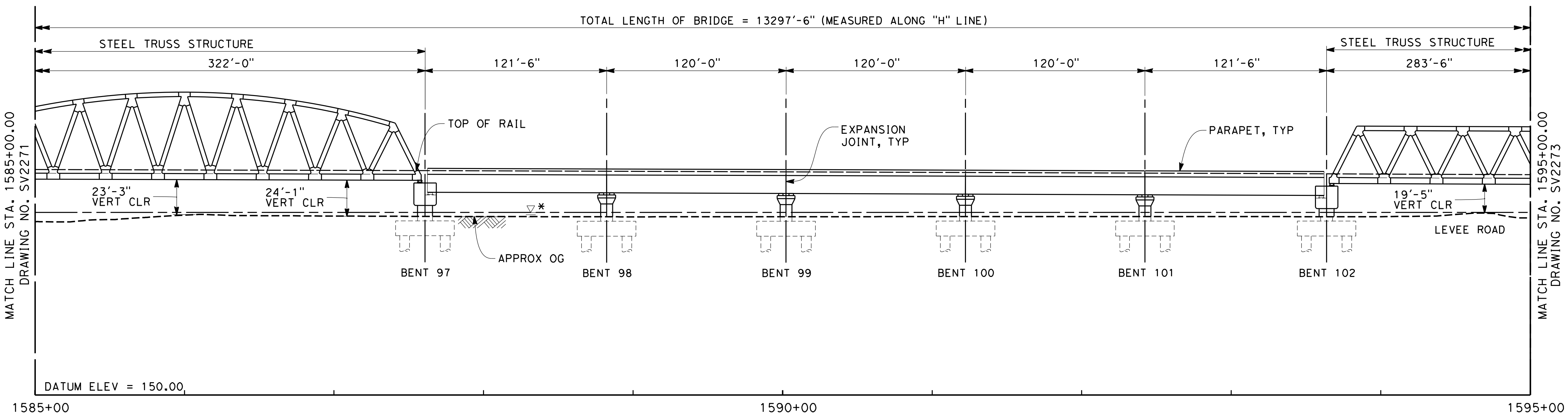
CALIFORNIA HIGH-SPEED TRAIN PROJECT
FRESNO TO BAKERSFIELD
HANFORD SUBSECTION
ALIGNMENT H
KINGS RIVER VIADUCT
PLAN AND ELEVATION

CONTRACT NO. HSR 06-0003
DRAWING NO. SV2271
SCALE AS SHOWN
SHEET NO. 14 OF 18



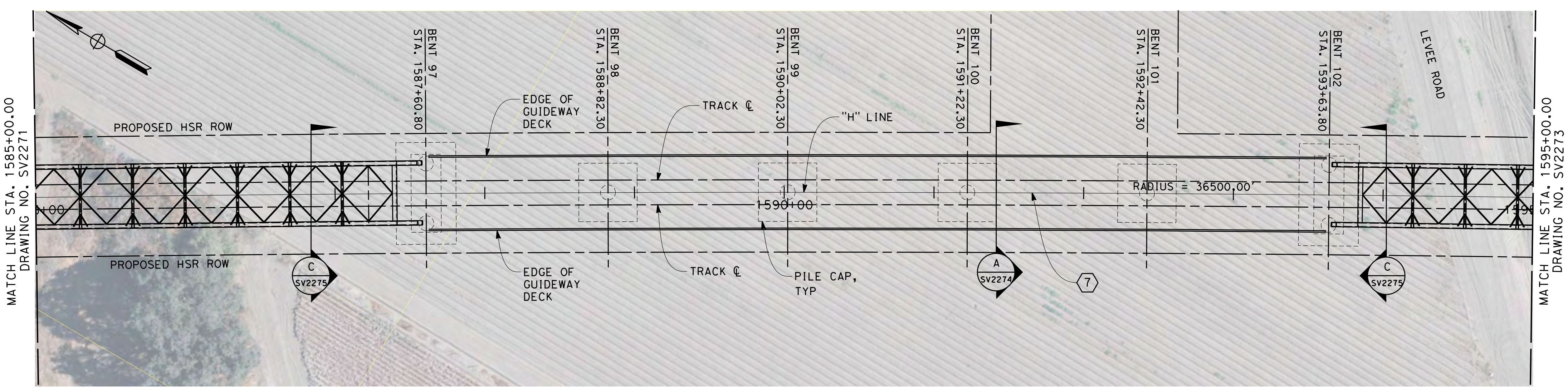
TOP OF RAIL "H" LINE

NO SCALE



ELEVATION

SCALE 1" = 40'



PLAN

SCALE 1" = 40'

NOTES

1. NOT ALL PILES SHOWN
2. PILE LENGTH TO BE DETERMINED
3. SUPERSTRUCTURE CONSTRUCTION, UON
   SIMPLE SPANS - MSS OR FLPM
   CONTINUOUS SPANS - BCC - PRECAST IN-SITU
   STEEL TRUSS - INSITU, SLID OR LAUNCHED
   ELEVATED SLABS - PC BEAM AND INSITU SLAB
4. UTILITY LOCATIONS TO BE DETERMINED
5. ACCESS STAIRWAYS ARE PROVIDED AT SYSTEMS SITES (APPROX. 2.5 MILE INTERVALS). LADDER ACCESS TO VIADUCTS IS PROVIDED AT 2500 FT INTERVALS WITH ACCESS ROAD AND TURNING CIRCLE WHERE NECESSARY.

LEGEND:

1 STRUCTURE APPROACH SLAB

2 RETAINING WALL

* ESTIMATED 100-YEAR FLOOD ELEVATION, SEE "FRESNO TO BAKERSFIELD CORRIDOR HYDROLOGY, HYDRAULICS AND DRAINAGE 15% DRAFT REPORT".

CURVE DATA

7

R = 36500.00'
Δ = 58° 05' 38.8"
T = 20271.5'
L = 37008.6'

40 0 40 80
1"=40'

RFP No.: 13-57 – Addendum No. 5 - 10/09/2014

REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY M. FISHER
DRAWN BY F. PALERMO
CHECKED BY A. ARMSTRONG
IN CHARGE R. COFFIN
DATE 12/31/13

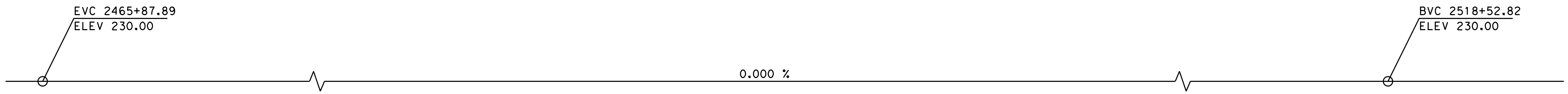
RECORD SET 15% DESIGN SUBMISSION - NOT FOR CONSTRUCTION

URS | HMM | ARUP
California High-Speed Train

CALIFORNIA HIGH-SPEED RAIL AUTHORITY

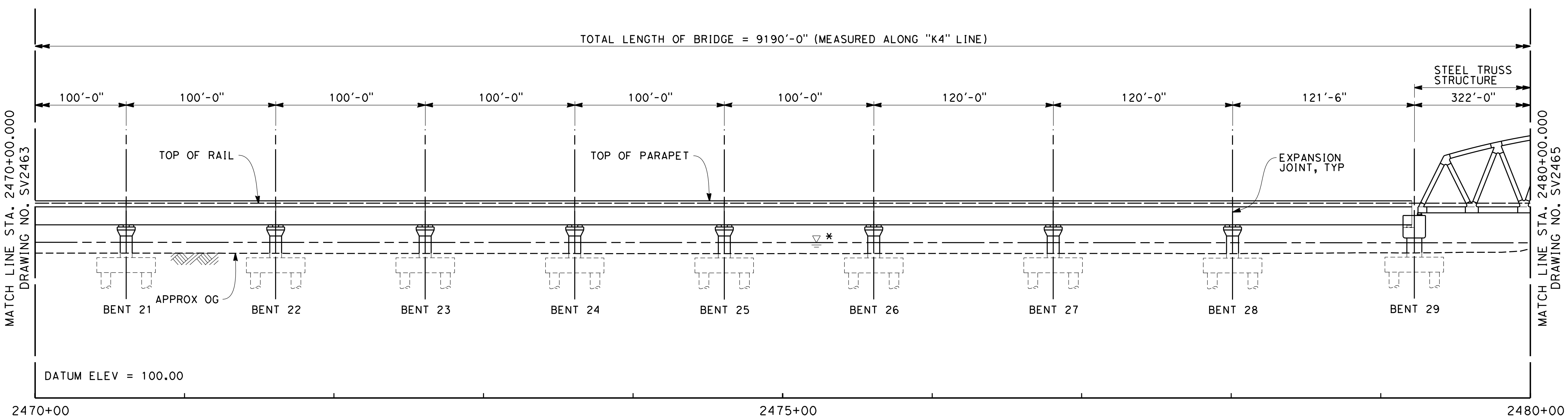
CALIFORNIA HIGH-SPEED TRAIN PROJECT
FRESNO TO BAKERSFIELD
HANFORD SUBSECTION
ALIGNMENT H
KINGS RIVER VIADUCT
PLAN AND ELEVATION

CONTRACT NO. HSR 06-0003
DRAWING NO. SV2272
SCALE AS SHOWN
SHEET NO. 15 OF 18



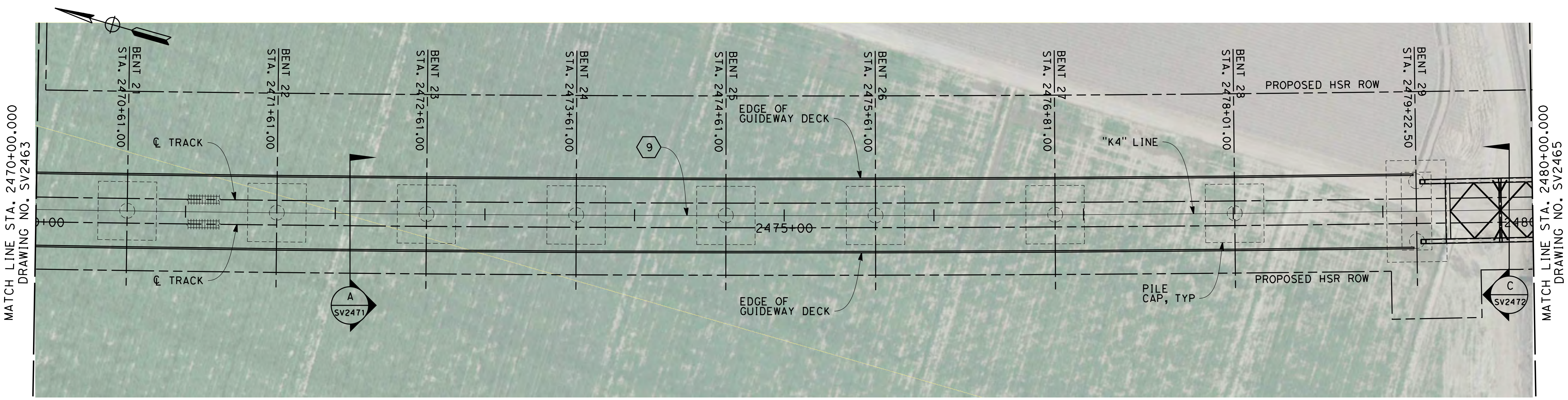
TOP OF RAIL "K4" LINE

NO SCALE



ELEVATION

SCALE 1" = 40'



PLAN

SCALE 1" = 40'

NOTES

1. NOT ALL PILES SHOWN
2. PILE LENGTH TO BE DETERMINED
3. SUPERSTRUCTURE CONSTRUCTION, UON
   - SIMPLE SPANS - MSS OR FLPM
   - CONTINUOUS SPANS - BCC - PRECAST IN-SITU
   - STEEL TRUSS - INSITU, SLID OR LAUNCHED
   - ELEVATED SLABS - PC BEAM AND INSITU SLAB
4. UTILITY LOCATIONS TO BE DETERMINED
5. ACCESS STAIRWAYS ARE PROVIDED AT SYSTEMS SITES (APPROX. 2.5 MILE INTERVALS). LADDER ACCESS TO VIADUCTS IS PROVIDED AT 2500 FT INTERVALS WITH ACCESS ROAD AND TURNING CIRCLE WHERE NECESSARY.

LEGEND:

1 STRUCTURE APPROACH SLAB

2 RETAINING WALL

* ESTIMATED 100-YEAR FLOOD ELEVATION, SEE "FRESNO TO BAKERSFIELD CORRIDOR HYDROLOGY, HYDRAULICS AND DRAINAGE 15% DRAFT REPORT".

CURVE DATA

9

R = 30500.00'

Δ = 49° 01' 18.3"

T = 13906.6'

L = 26095.5'

40 0 40 80

1"=40'

REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY M. FISHER
DRAWN BY F. PALERMO
CHECKED BY A. ARMSTRONG
IN CHARGE R. COFFIN
DATE 12/31/13

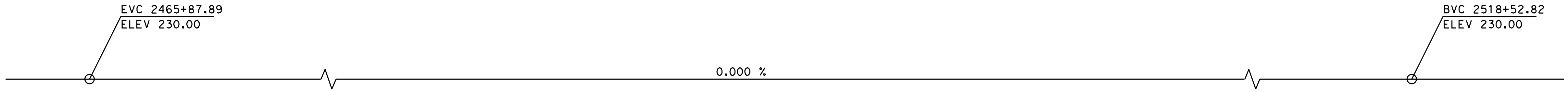
RECORD SET 15% DESIGN SUBMISSION - NOT FOR CONSTRUCTION

URS | HMM | ARUP — California High-Speed Train

CALIFORNIA HIGH-SPEED RAIL AUTHORITY

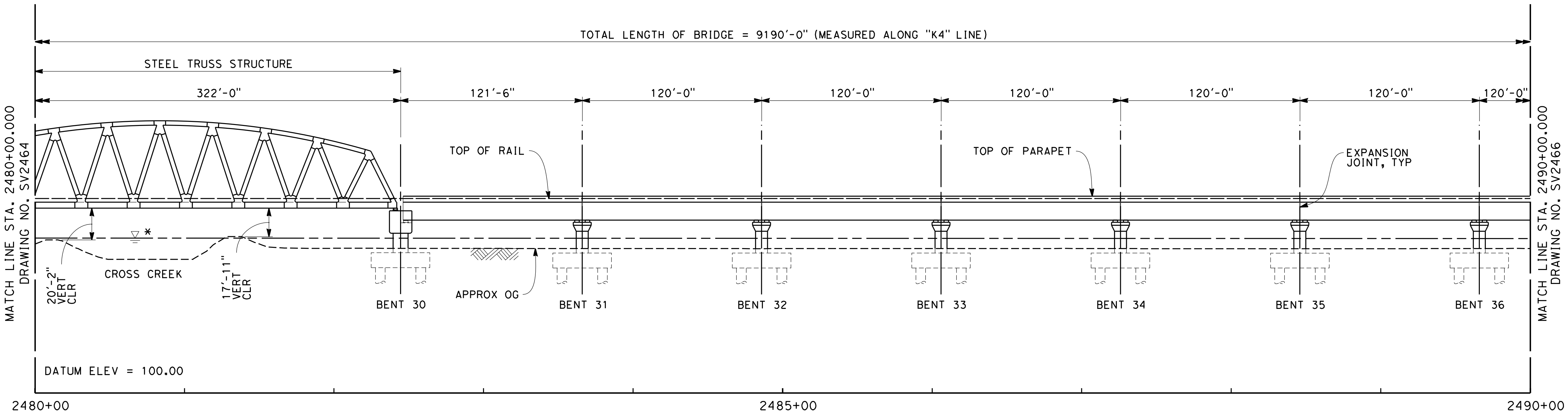
CALIFORNIA HIGH-SPEED TRAIN PROJECT
FRESNO TO BAKERSFIELD
KAWEAH SUBSECTION
ALIGNMENT K4
CROSS CREEK VIADUCT
PLAN AND ELEVATION

CONTRACT NO. HSR 06-0003
DRAWING NO. SV2464
SCALE AS SHOWN
SHEET NO. 5 OF 13



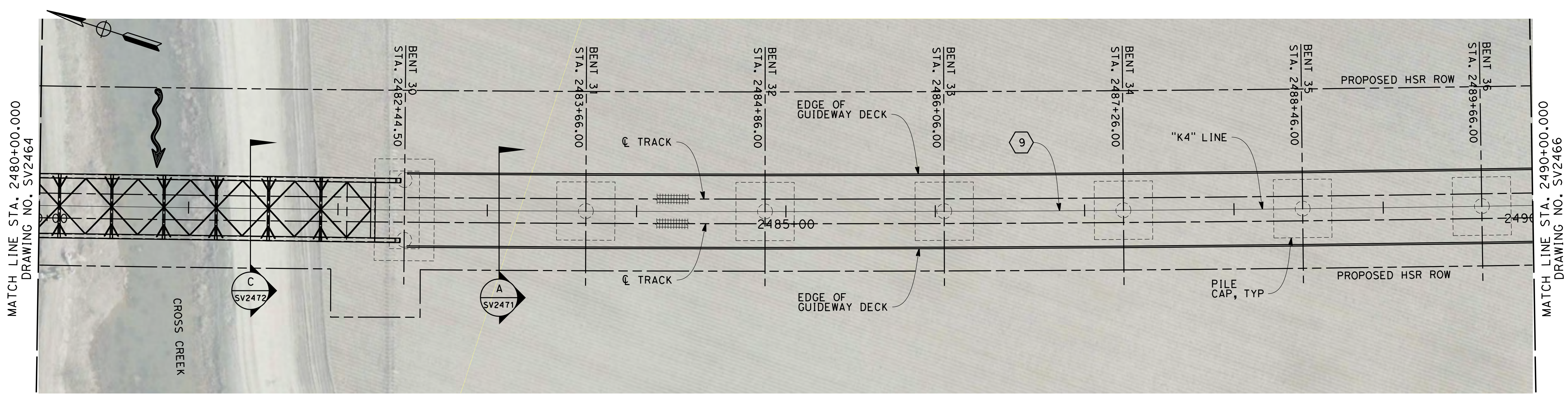
TOP OF RAIL "K4" LINE

NO SCALE



ELEVATION

SCALE 1" = 40'



PLAN

SCALE 1" = 40'

NOTES

1. NOT ALL PILES SHOWN
2. PILE LENGTH TO BE DETERMINED
3. SUPERSTRUCTURE CONSTRUCTION, UON
   SIMPLE SPANS - MSS OR FLPM
   CONTINUOUS SPANS - BCC - PRECAST IN-SITU
   STEEL TRUSS - INSITU, SLID OR LAUNCHED
   ELEVATED SLABS - PC BEAM AND INSITU SLAB
4. UTILITY LOCATIONS TO BE DETERMINED
5. ACCESS STAIRWAYS ARE PROVIDED AT SYSTEMS SITES (APPROX. 2.5 MILE INTERVALS). LADDER ACCESS TO VIADUCTS IS PROVIDED AT 2500 FT INTERVALS WITH ACCESS ROAD AND TURNING CIRCLE WHERE NECESSARY.

RFP No.: 13-57 – Addendum No. 5 - 10/09/2014

LEGEND:

(1) STRUCTURE APPROACH SLAB

(2) RETAINING WALL

* ESTIMATED 100-YEAR FLOOD ELEVATION, SEE "FRESNO TO BAKERSFIELD CORRIDOR HYDROLOGY, HYDRAULICS AND DRAINAGE 15% DRAFT REPORT".

CURVE DATA

(9)

R = 30500.00'

Δ = 49° 01' 18.3"

T = 13906.6'

L = 26095.5'

40 0 40 80

1"=40'

REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY M. FISHER
DRAWN BY F. PALERMO
CHECKED BY A. ARMSTRONG
IN CHARGE R. COFFIN
DATE 12/31/13

RECORD SET 15% DESIGN SUBMISSION - NOT FOR CONSTRUCTION

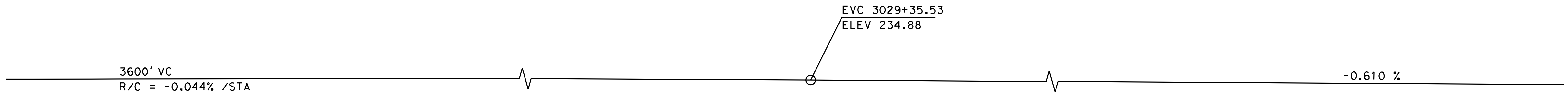
URS | HMM | ARUP California High-Speed Train

CALIFORNIA HIGH-SPEED RAIL AUTHORITY

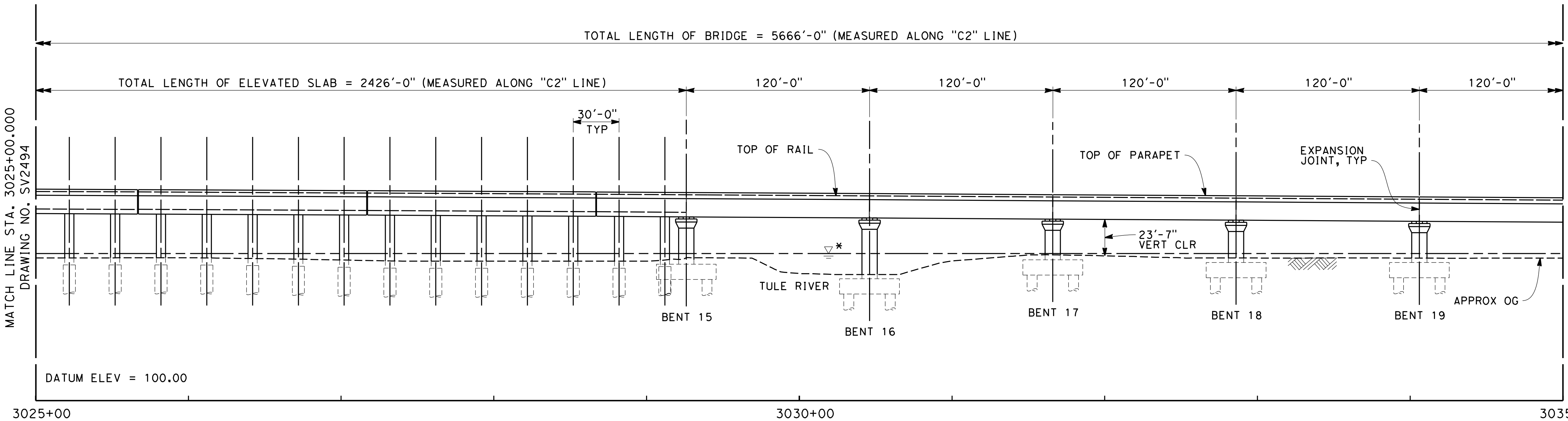
CALIFORNIA HIGH-SPEED TRAIN PROJECT
FRESNO TO BAKERSFIELD
KAWEAH SUBSECTION
ALIGNMENT K4
CROSS CREEK VIADUCT
PLAN AND ELEVATION

CONTRACT NO. HSR 06-0003
DRAWING NO. SV2465
SCALE AS SHOWN
SHEET NO. 6 OF 13

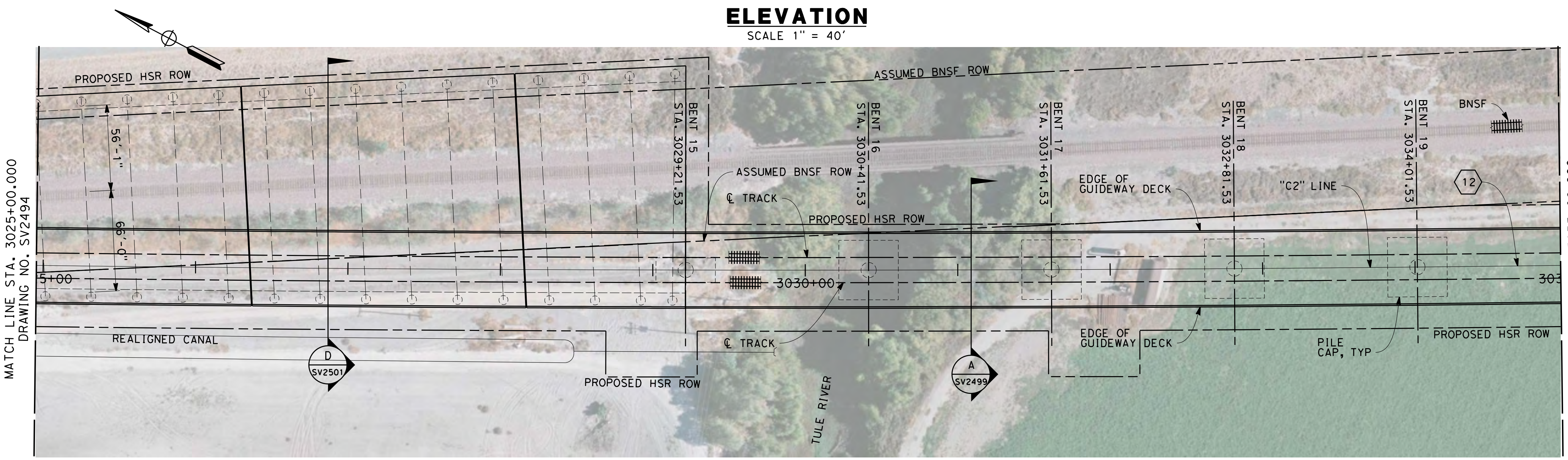
andrew.armstrong 2/12/2013 2:05:01 PM c:\pwworking\hmm\external\andrew.armstrong-arup.com\d0125236\FB-SV-2465-K4.dgn



TOP OF RAIL "C2" LINE
NO SCALE



ELEVATION
SCALE 1" = 40'



PLAN
SCALE 1" = 40'

NOTES
1. NOT ALL PILES SHOWN
2. PILE LENGTH TO BE DETERMINED
3. SUPERSTRUCTURE CONSTRUCTION, UON
   - SIMPLE SPANS - MSS OR FLPM
   - CONTINUOUS SPANS - BCC - PRECAST IN-SITU
   - STEEL TRUSS - INSITU, SLID OR LAUNCHED
   - ELEVATED SLABS - PC BEAM AND INSITU SLAB
4. UTILITY LOCATIONS TO BE DETERMINED
5. ACCESS STAIRWAYS ARE PROVIDED AT SYSTEMS SITES (APPROX. 2.5 MILE INTERVALS). LADDER ACCESS TO VIADUCTS IS PROVIDED AT 2500 FT INTERVALS WITH ACCESS ROAD AND TURNING CIRCLE WHERE NECESSARY.

LEGEND:

1 STRUCTURE APPROACH SLAB

2 RETAINING WALL

* ESTIMATED 100-YEAR FLOOD ELEVATION, SEE "FRESNO TO BAKERSFIELD CORRIDOR HYDROLOGY, HYDRAULICS AND DRAINAGE 15% DRAFT REPORT".

CURVE DATA

12

R = 41000.00'
Δ = 01° 14' 39.4"
T = 1846.0'
L = 9734.5'

40 0 40 80
1"=40'

REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY M. FISHER
DRAWN BY F. PALERMO
CHECKED BY A. ARMSTRONG
IN CHARGE R. COFFIN
DATE 12/31/13

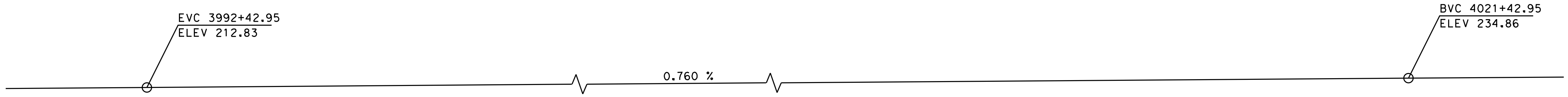
RECORD SET 15% DESIGN SUBMISSION - NOT FOR CONSTRUCTION

URS | HMM | ARUP
California High-Speed Train

CALIFORNIA HIGH-SPEED RAIL AUTHORITY

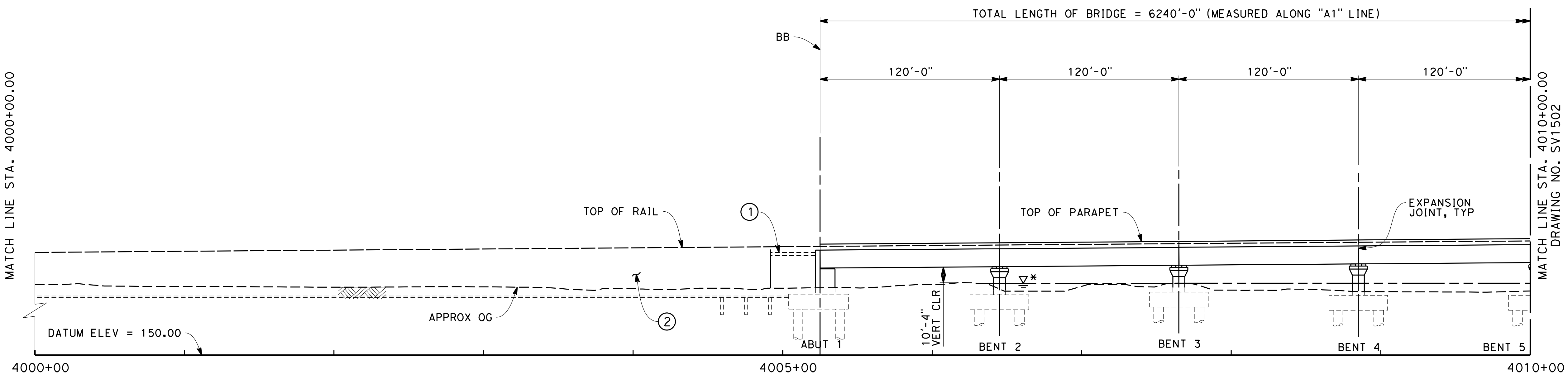
CALIFORNIA HIGH-SPEED TRAIN PROJECT
FRESNO TO BAKERSFIELD
CORCORAN BYPASS SUBSECTION
ALIGNMENT C2
STATE ROUTE 43 BNSF VIADUCT
PLAN AND ELEVATION

CONTRACT NO. HSR 06-0003
DRAWING NO. SV2495
SCALE AS SHOWN
SHEET NO. 6 OF 11



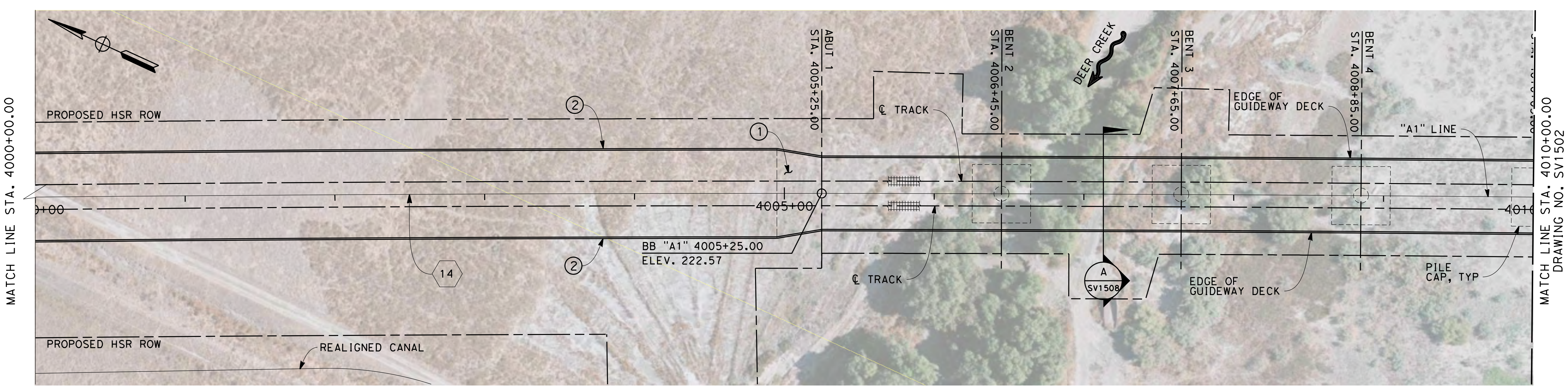
TOP OF RAIL "A1" LINE

NO SCALE



ELEVATION

SCALE 1" = 40'



PLAN

SCALE 1" = 40'

NOTES

1. NOT ALL PILES SHOWN
2. PILE LENGTH TO BE DETERMINED
3. SUPERSTRUCTURE CONSTRUCTION, UON
   - SIMPLE SPANS - MSS OR FLPM
   - CONTINUOUS SPANS - BCC - PRECAST IN-SITU
   - STEEL TRUSS - INSITU, SLID OR LAUNCHED
   - ELEVATED SLABS - PC BEAM AND INSITU SLAB
4. UTILITY LOCATIONS TO BE DETERMINED
5. ACCESS STAIRWAYS ARE PROVIDED AT SYSTEMS SITES (APPROX. 2.5 MILE INTERVALS). LADDER ACCESS TO VIADUCTS IS PROVIDED AT 2500 FT INTERVALS WITH ACCESS ROAD AND TURNING CIRCLE WHERE NECESSARY.

LEGEND:

1 STRUCTURE APPROACH SLAB

2 RETAINING WALL

* ESTIMATED 100-YEAR FLOOD ELEVATION, SEE "FRESNO TO BAKERSFIELD CORRIDOR HYDROLOGY, HYDRAULICS AND DRAINAGE 15% DRAFT REPORT".

CURVE DATA

14

R = 50500.0'
Δ = 24° 16' 19.0"
T = 10859.4'
L = 21393.1'

40 0 40 80
1"=40'

REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY M. FISHER
DRAWN BY F. PALERMO
CHECKED BY A. ARMSTRONG
IN CHARGE R. COFFIN
DATE 12/31/13

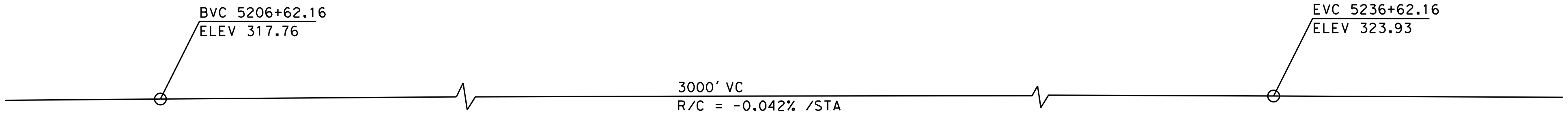
RECORD SET 15% DESIGN SUBMISSION - NOT FOR CONSTRUCTION

URS | HMM | ARUP
California High-Speed Train

CALIFORNIA HIGH-SPEED RAIL AUTHORITY

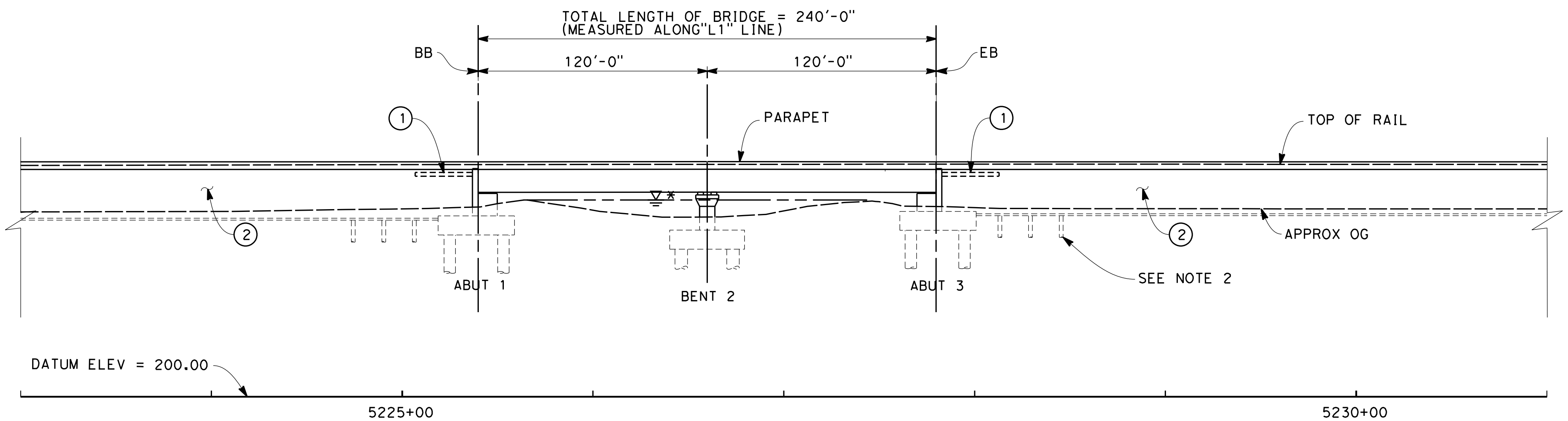
CALIFORNIA HIGH-SPEED TRAIN PROJECT
FRESNO TO BAKERSFIELD
ALLENSWORTH BYPASS SUBSECTION
ALIGNMENT A1
DEER CREEK VIADUCT
PLAN AND ELEVATION

CONTRACT NO. HSR 06-0003
DRAWING NO. SV1501
SCALE AS SHOWN
SHEET NO. 2 OF 9



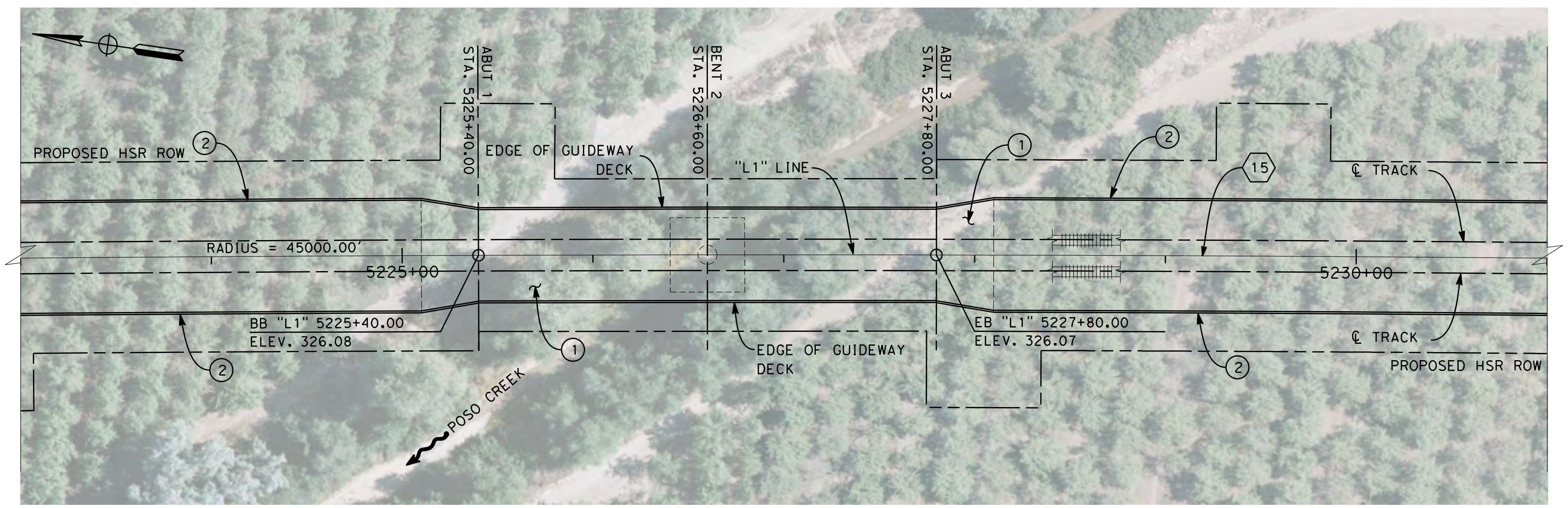
TOP OF RAIL "L1" LINE

NO SCALE



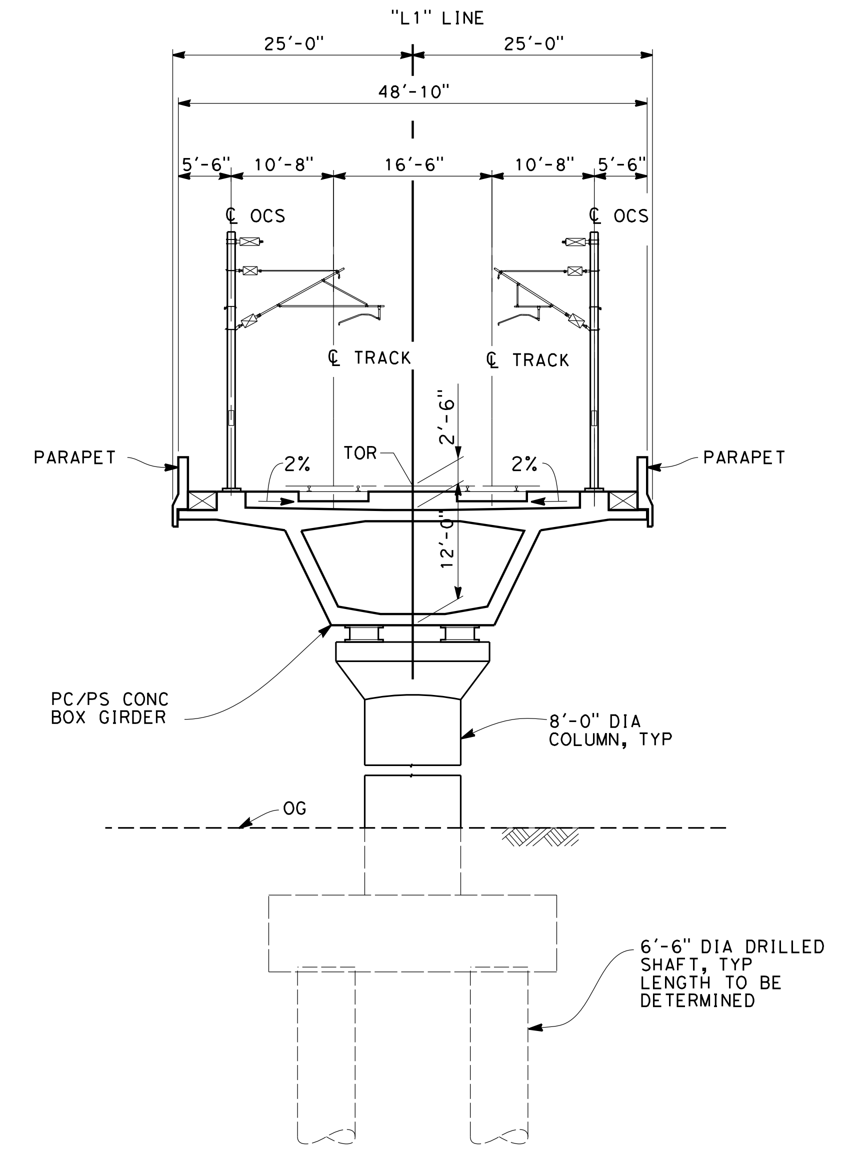
ELEVATION

SCALE 1" = 40'



PLAN

SCALE 1" = 40'



TYPICAL SECTION

SCALE 1" = 10'

NOTES:

1. PILE LENGTH TO BE DETERMINED
2. ALL PILES ARE NOT SHOWN

* ESTIMATED 100-YEAR FLOOD ELEVATION, "FRESNO TO BAKERSFIELD CORRIDOR HYDROLOGY, HYDRAULICS AND DRAINAGE 15% DRAFT REPORT"

LEGEND:

1 STRUCTURE APPROACH SLAB

2 RETAINING WALL

CURVE DATA

15

R = 45000.00'
Δ = 17° 49' 41.4"
T = 7058.1'
L = 14002.2'

10 0 10 20 — 1"=10'

40 0 40 80 — 1"=40'

REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY M. FISHER
DRAWN BY F. PALERMO
CHECKED BY A. ARMSTRONG
IN CHARGE R. COFFIN
DATE 12/31/13

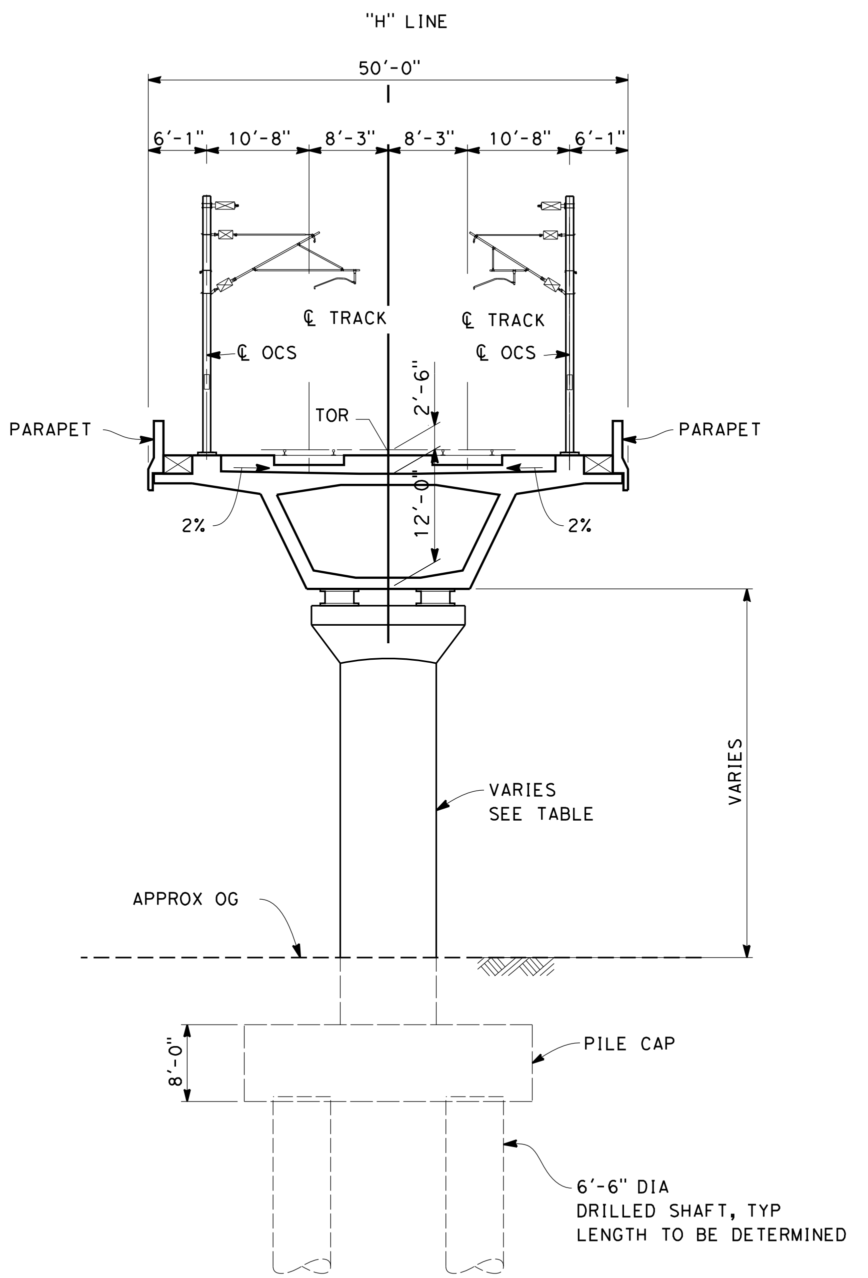
RECORD SET 15% DESIGN SUBMISSION
-
NOT FOR CONSTRUCTION

URS | HMM | ARUP — California High-Speed Train

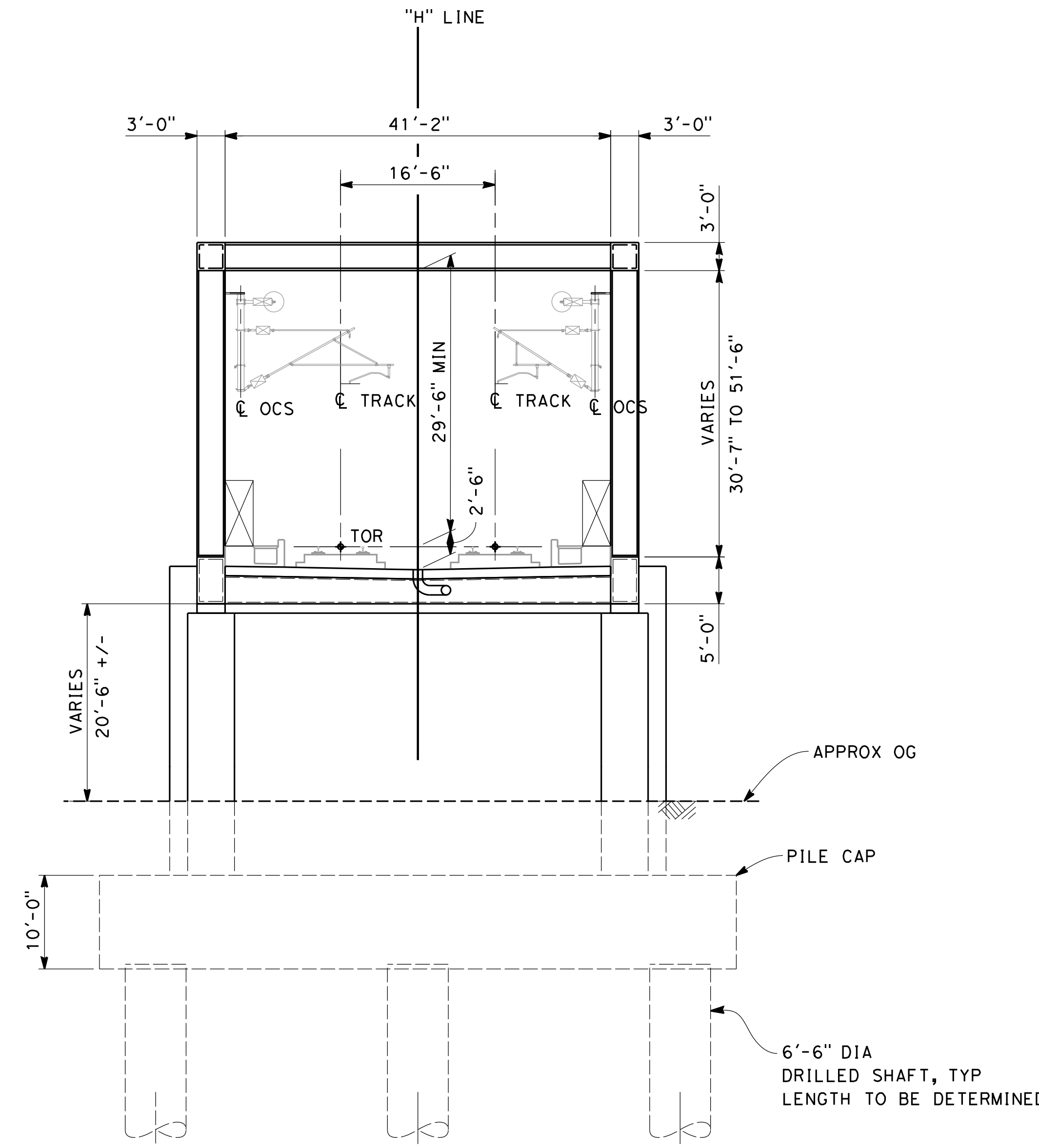
CALIFORNIA HIGH-SPEED RAIL AUTHORITY

CALIFORNIA HIGH-SPEED TRAIN PROJECT
FRESNO TO BAKERSFIELD
POSO CREEK SUBSECTION
ALIGNMENT L1
POSO CREEK BRIDGE
PLAN AND ELEVATION

CONTRACT NO. HSR 06-0003
DRAWING NO. SV1601
SCALE AS SHOWN
SHEET NO. 2 OF 2



COLUMN DIAMETERS	
COLUMN HEIGHT	DIAMETER
0-20	8 FT
20-40	10 FT
40-50	12 FT
50-60	15 FT
60-80	20 FT
80-100	25 FT



SECTION A

SCALE: 1" = 10'

STA 1468+18 THROUGH 1485+70
STA 1489+27 THROUGH 1518+30
STA 1525+44 THROUGH 1580+87
STA 1587+31 THROUGH 1593+34

SECTION B

SCALE: 1" = 10'

STA 1463+48 (BENT 2)
STA 1466+96 (BENT 3)
STA 1596+52 (ABUT 90)

10 0 10 20
1"-10'

RFP No.: 13-57 – Addendum No. 5 - 10/09/2014

frank.palermo 12/23/2013 2:42:58 PM c:\pwworking\hmm\external\frank.palermo01-arup.com\d0128411\FB-SV-2274-H.dgn

REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY M. FISHER
DRAWN BY F. PALERMO
CHECKED BY A. ARMSTRONG
IN CHARGE R. COFFIN
DATE 12/31/13

RECORD SET 15% DESIGN SUBMISSION
-
NOT FOR CONSTRUCTION

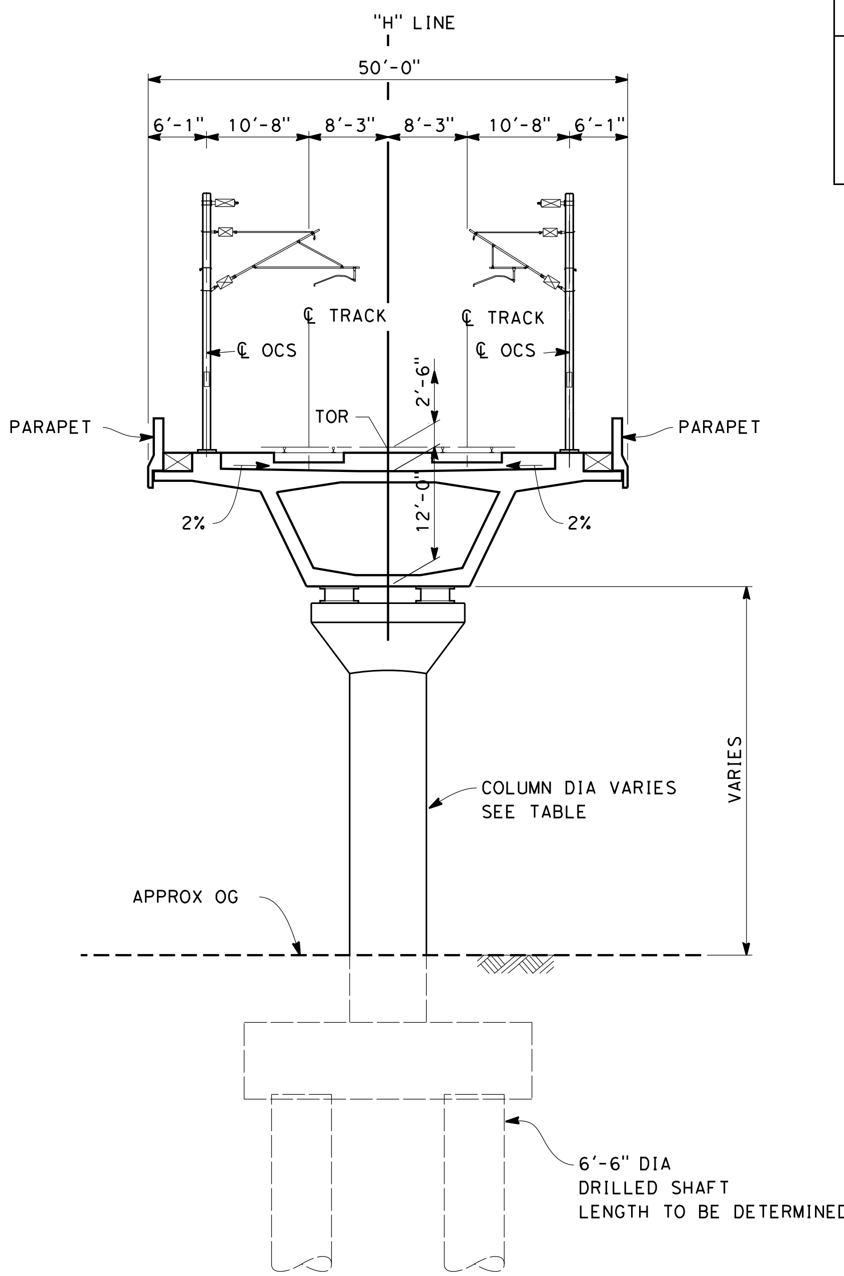
URS | HMM | ARUP
California High-Speed Train

CALIFORNIA
HIGH-SPEED RAIL AUTHORITY

CALIFORNIA HIGH-SPEED TRAIN PROJECT
FRESNO TO BAKERSFIELD
HANFORD SUBSECTION
ALIGNMENT H
KINGS RIVER VIADUCT
TYPICAL SECTIONS

CONTRACT NO. HSR 06-0003
DRAWING NO. SV2274
SCALE AS SHOWN
SHEET NO. 17 OF 18

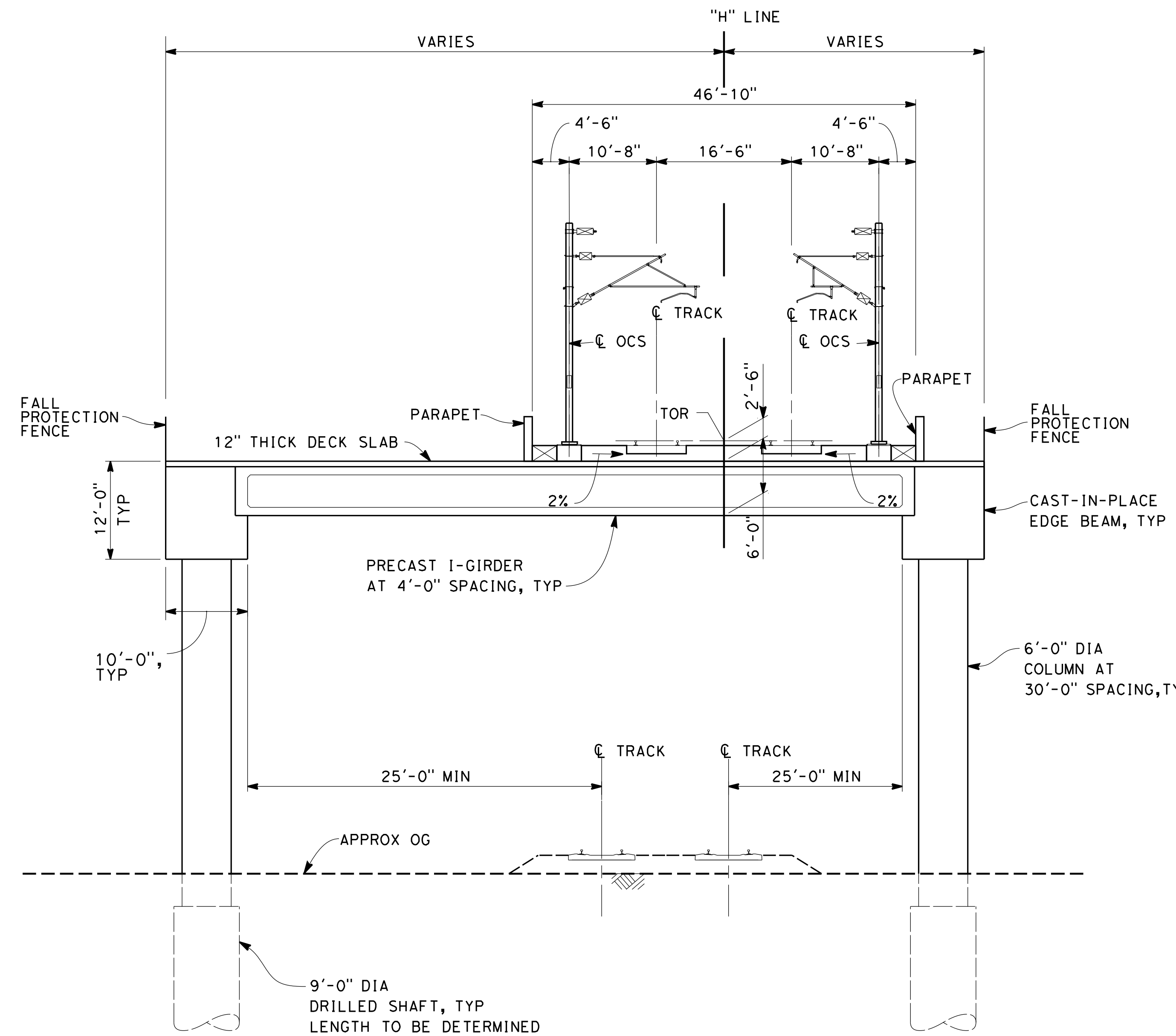
COLUMN DIAMETERS	
COLUMN HEIGHT	DIAMETER
0-20	8 FT
20-40	10 FT
40-50	12 FT
50-60	15 FT
60-80	20 FT
80-100	25 FT



SECTION A

SCALE: 1" = 10'

STA 1105+70 THROUGH 1123+80
STA 1133+40 THROUGH 1156+20



SECTION B

SCALE: 1" = 10'

STA 1123+80 THROUGH 1133+40

10 0 10 20
1"=10'

REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY M. FISHER
DRAWN BY F. PALERMO
CHECKED BY A. ARMSTRONG
IN CHARGE R. COFFIN
DATE 12/31/13

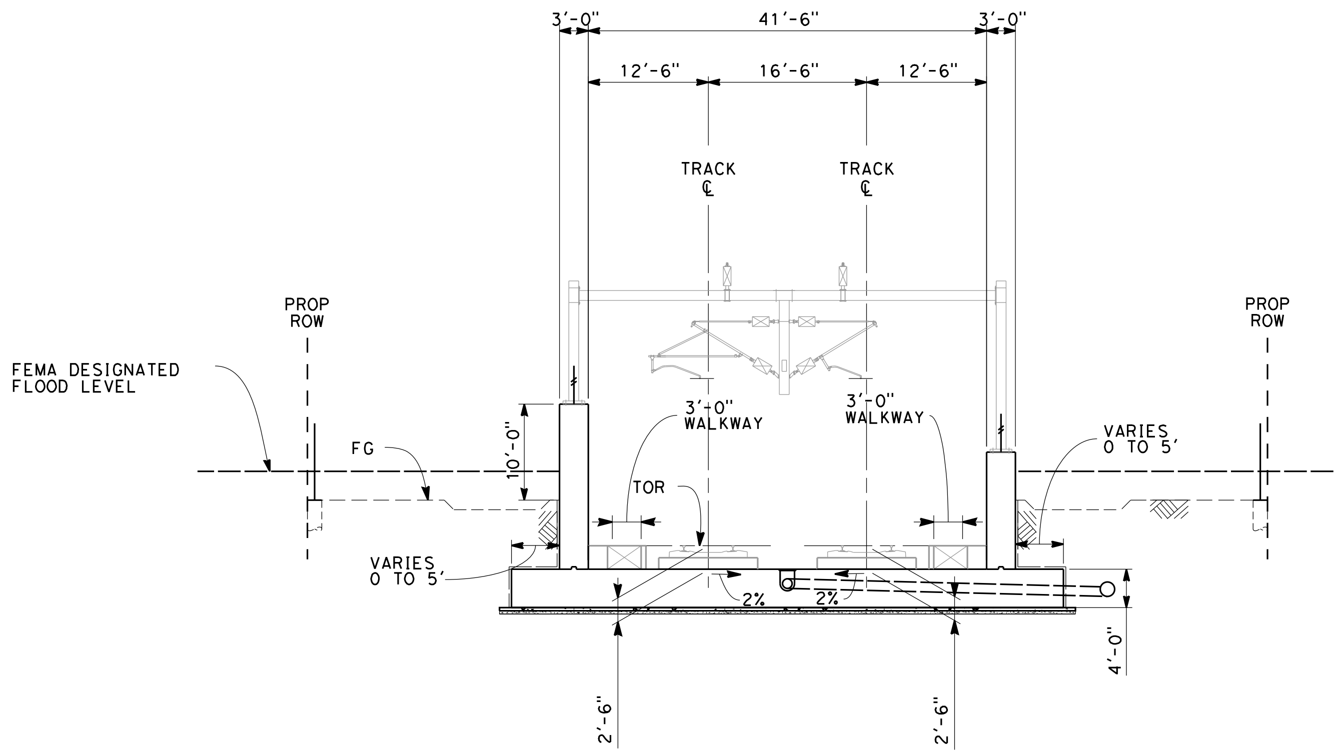
RECORD SET 15% DESIGN SUBMISSION - NOT FOR CONSTRUCTION

URS | HMM | ARUP
California High-Speed Train

CALIFORNIA
HIGH-SPEED RAIL AUTHORITY

CALIFORNIA HIGH-SPEED TRAIN PROJECT
FRESNO TO BAKERSFIELD
HANFORD SUBSECTION
ALIGNMENT H
CONEJO VIADUCT
TYPICAL SECTIONS

CONTRACT NO. HSR 06-0003
DRAWING NO. SV2227
SCALE AS SHOWN
SHEET NO. 8 OF 8



SECTION A
SCALE: 1" = 10'

RFP No.: 13-57 – Addendum No. 5 - 10/09/2014

Nadine.Hutton 12/12/2013 8:08:55 PM c:\pwworking\hmm\external\nadine.hutton-arup.com\d0138504\FB-SV2199.dgn

REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY A. ARMSTRONG
DRAWN BY F. PALERMO
CHECKED BY M. FISHER
IN CHARGE R. COFFIN
DATE 12/31/13

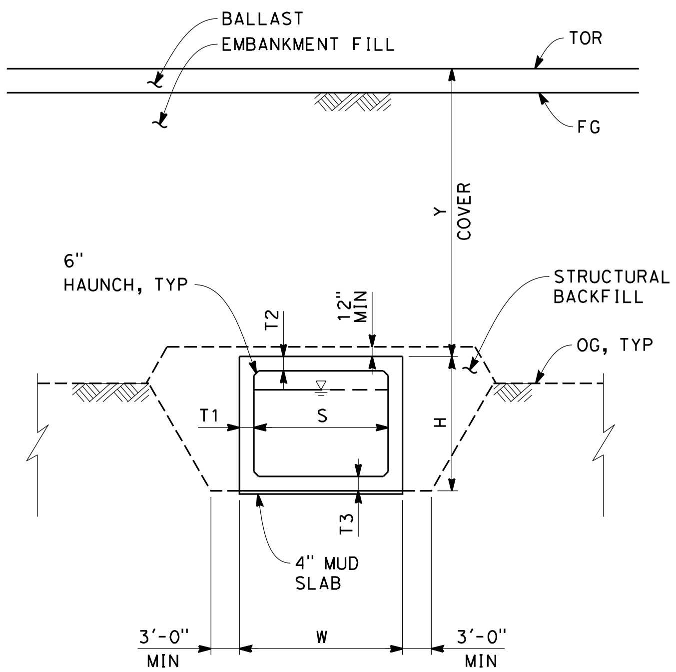
RECORD SET 15% DESIGN SUBMISSION
-
NOT FOR CONSTRUCTION

URS | HMM | ARUP
CALIFORNIA HIGH-SPEED TRAIN

CALIFORNIA
HIGH-SPEED RAIL AUTHORITY

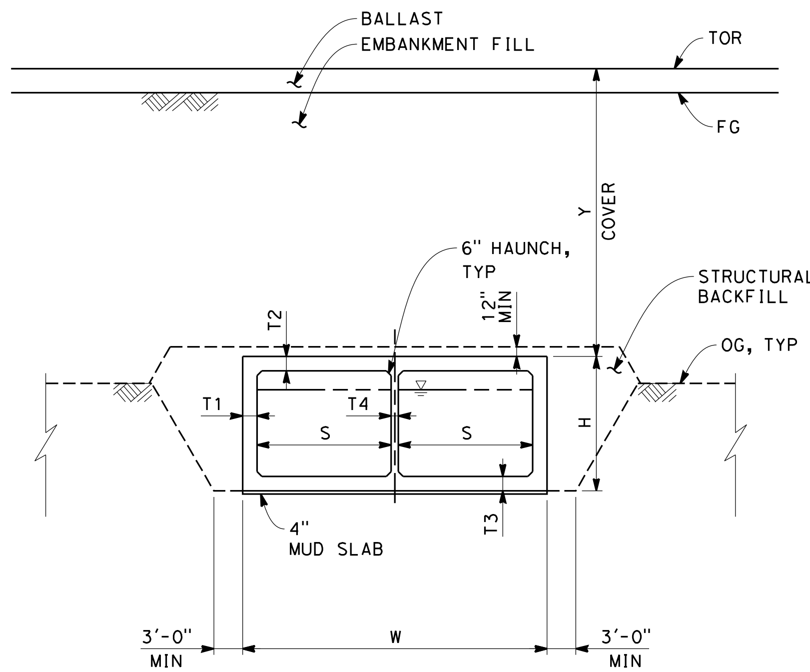
CALIFORNIA HIGH-SPEED TRAIN PROJECT
FRESNO TO BAKERSFIELD
FRSNO SUBSECTION
ALIGNMENT F1
JENSEN TRENCH
TYPICAL SECTIONS

CONTRACT NO. HSR 06-0003
DRAWING NO. SV2199
SCALE AS SHOWN
SHEET NO. 10 OF 10



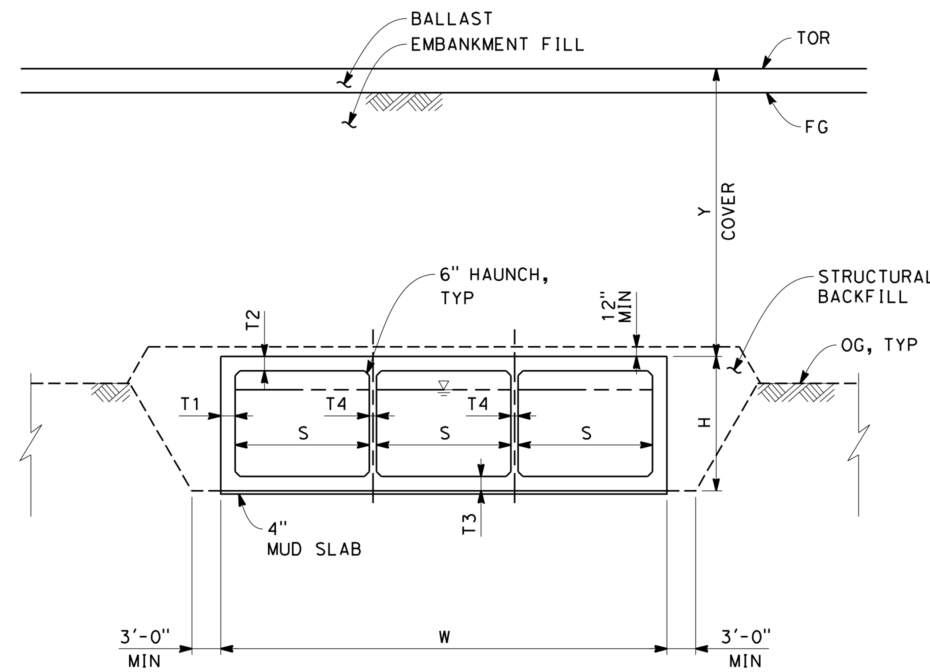
SINGLE CELL BOX CULVERT

SCALE: 1" = 10'



2-CELL BOX CULVERT

SCALE: 1" = 10'



3-CELL BOX CULVERT

SCALE: 1" = 10'

SINGLE-CELL BOX CULVERT

COVER	SPAN	HEIGHT	WIDTH	T1	T2	T3
6'- 0"	10'- 0"	5'- 0"	12'- 0"	1'- 0"	1'- 0"	1'- 0"
6'- 0"	10'- 0"	10'- 0"	12'- 0"	1'- 0"	1'- 0"	1'- 0"
6'- 0"	15'- 0"	5'- 0"	17'- 0"	1'- 0"	1'- 0"	1'- 0"
6'- 0"	15'- 0"	10'- 0"	17'- 0"	1'- 0"	1'- 0"	1'- 0"
10'- 0"	10'- 0"	5'- 0"	12'- 0"	1'- 0"	1'- 0"	1'- 0"
10'- 0"	10'- 0"	10'- 0"	12'- 0"	1'- 0"	1'- 0"	1'- 0"
10'- 0"	15'- 0"	5'- 0"	17'- 0"	1'- 0"	1'- 0"	1'- 0"
10'- 0"	15'- 0"	10'- 0"	17'- 0"	1'- 0"	1'- 0"	1'- 0"
15'- 0"	10'- 0"	5'- 0"	12'- 0"	1'- 0"	1'- 0"	1'- 0"
15'- 0"	10'- 0"	10'- 0"	12'- 0"	1'- 0"	1'- 0"	1'- 0"
15'- 0"	15'- 0"	5'- 0"	17'- 0"	1'- 0"	1'- 0"	1'- 0"
15'- 0"	15'- 0"	10'- 0"	17'- 0"	1'- 0"	1'- 0"	1'- 0"
20'- 0"	10'- 0"	5'- 0"	12'- 0"	1'- 0"	1'- 0"	1'- 0"
20'- 0"	10'- 0"	10'- 0"	12'- 0"	1'- 0"	1'- 0"	1'- 0"
20'- 0"	15'- 0"	5'- 0"	17'- 2"	1'- 1"	1'- 1"	1'- 1"
20'- 0"	15'- 0"	10'- 0"	17'- 2"	1'- 1"	1'- 1"	1'- 1"
25'- 0"	10'- 0"	5'- 0"	12'- 0"	1'- 0"	1'- 0"	1'- 0"
25'- 0"	10'- 0"	10'- 0"	12'- 0"	1'- 0"	1'- 0"	1'- 0"
25'- 0"	15'- 0"	5'- 0"	17'- 6"	1'- 3"	1'- 3"	1'- 3"
25'- 0"	15'- 0"	10'- 0"	17'- 6"	1'- 3"	1'- 3"	1'- 3"
30'- 0"	10'- 0"	5'- 0"	12'- 0"	1'- 0"	1'- 0"	1'- 0"
30'- 0"	10'- 0"	10'- 0"	12'- 0"	1'- 0"	1'- 0"	1'- 0"
30'- 0"	15'- 0"	5'- 0"	17'- 8"	1'- 4"	1'- 4"	1'- 4"
30'- 0"	15'- 0"	10'- 0"	17'- 8"	1'- 4"	1'- 4"	1'- 4"

2-CELL BOX CULVERT

COVER	SPAN	HEIGHT	WIDTH	T1	T2	T3	T4
6'- 0"	10'- 0"	5'- 0"	22'-10"	1'- 0"	1'- 0"	1'- 0"	0'-10"
6'- 0"	10'- 0"	10'- 0"	22'-10"	1'- 0"	1'- 0"	1'- 0"	0'-10"
6'- 0"	15'- 0"	5'- 0"	32'-10"	1'- 0"	1'- 0"	1'- 0"	0'-10"
6'- 0"	15'- 0"	10'- 0"	32'-10"	1'- 0"	1'- 0"	1'- 0"	0'-10"
10'- 0"	10'- 0"	5'- 0"	22'-10"	1'- 0"	1'- 0"	1'- 0"	0'-10"
10'- 0"	10'- 0"	10'- 0"	22'-10"	1'- 0"	1'- 0"	1'- 0"	0'-10"
10'- 0"	15'- 0"	5'- 0"	32'-10"	1'- 0"	1'- 0"	1'- 0"	0'-10"
10'- 0"	15'- 0"	10'- 0"	32'-10"	1'- 0"	1'- 0"	1'- 0"	0'-10"
15'- 0"	10'- 0"	5'- 0"	22'-10"	1'- 0"	1'- 0"	1'- 0"	0'-10"
15'- 0"	10'- 0"	10'- 0"	22'-10"	1'- 0"	1'- 0"	1'- 0"	0'-10"
15'- 0"	15'- 0"	5'- 0"	32'-10"	1'- 0"	1'- 0"	1'- 0"	0'-10"
15'- 0"	15'- 0"	10'- 0"	32'-10"	1'- 0"	1'- 0"	1'- 0"	0'-10"
20'- 0"	10'- 0"	5'- 0"	22'-10"	1'- 0"	1'- 0"	1'- 0"	0'-10"
20'- 0"	10'- 0"	10'- 0"	22'-10"	1'- 0"	1'- 0"	1'- 0"	0'-10"
20'- 0"	15'- 0"	5'- 0"	33'- 0"	1'- 1"	1'- 1"	1'- 1"	0'-10"
20'- 0"	15'- 0"	10'- 0"	33'- 0"	1'- 1"	1'- 1"	1'- 1"	0'-10"
25'- 0"	10'- 0"	5'- 0"	22'-10"	1'- 0"	1'- 0"	1'- 0"	0'-10"
25'- 0"	10'- 0"	10'- 0"	22'-10"	1'- 0"	1'- 0"	1'- 0"	0'-10"
25'- 0"	15'- 0"	5'- 0"	33'- 6"	1'- 3"	1'- 3"	1'- 3"	1'- 0"
25'- 0"	15'- 0"	10'- 0"	33'- 6"	1'- 3"	1'- 3"	1'- 3"	1'- 0"
30'- 0"	10'- 0"	5'- 0"	22'-10"	1'- 0"	1'- 0"	1'- 0"	0'-10"
30'- 0"	10'- 0"	10'- 0"	22'-10"	1'- 0"	1'- 0"	1'- 0"	0'-10"
30'- 0"	15'- 0"	5'- 0"	33'- 9"	1'- 4"	1'- 4"	1'- 4"	1'- 1"
30'- 0"	15'- 0"	10'- 0"	33'- 9"	1'- 4"	1'- 4"	1'- 4"	1'- 1"

3-CELL BOX CULVERT

COVER	SPAN	HEIGHT	WIDTH	T1	T2	T3	T4
6'- 0"	10'- 0"	5'- 0"	33'- 7"	1'- 0"	1'- 0"	1'- 0"	0'-10"
6'- 0"	10'- 0"	10'- 0"	33'- 7"	1'- 0"	1'- 0"	1'- 0"	0'-10"
6'- 0"	15'- 0"	5'- 0"	48'- 7"	1'- 0"	1'- 0"	1'- 0"	0'-10"
6'- 0"	15'- 0"	10'- 0"	48'- 7"	1'- 0"	1'- 0"	1'- 0"	0'-10"
10'- 0"	10'- 0"	5'- 0"	33'- 7"	1'- 0"	1'- 0"	1'- 0"	0'-10"
10'- 0"	10'- 0"	10'- 0"	33'- 7"	1'- 0"	1'- 0"	1'- 0"	0'-10"
10'- 0"	15'- 0"	5'- 0"	48'- 7"	1'- 0"	1'- 0"	1'- 0"	0'-10"
10'- 0"	15'- 0"	10'- 0"	48'- 7"	1'- 0"	1'- 0"	1'- 0"	0'-10"
15'- 0"	10'- 0"	5'- 0"	33'- 7"	1'- 0"	1'- 0"	1'- 0"	0'-10"
15'- 0"	10'- 0"	10'- 0"	33'- 7"	1'- 0"	1'- 0"	1'- 0"	0'-10"
15'- 0"	15'- 0"	5'- 0"	48'- 7"	1'- 0"	1'- 0"	1'- 0"	0'-10"
15'- 0"	15'- 0"	10'- 0"	48'- 7"	1'- 0"	1'- 0"	1'- 0"	0'-10"
20'- 0"	10'- 0"	5'- 0"	33'- 7"	1'- 0"	1'- 0"	1'- 0"	0'-10"
20'- 0"	10'- 0"	10'- 0"	33'- 7"	1'- 0"	1'- 0"	1'- 0"	0'-10"
20'- 0"	15'- 0"	5'- 0"	48'-11"	1'- 1"	1'- 1"	1'- 1"	0'-10"
20'- 0"	15'- 0"	10'- 0"	48'-11"	1'- 1"	1'- 1"	1'- 1"	0'-10"
25'- 0"	10'- 0"	5'- 0"	33'- 7"	1'- 0"	1'- 0"	1'- 0"	0'-10"
25'- 0"	10'- 0"	10'- 0"	33'- 7"	1'- 0"	1'- 0"	1'- 0"	0'-10"
25'- 0"	15'- 0"	5'- 0"	49'- 6"	1'- 3"	1'- 3"	1'- 3"	1'- 0"
25'- 0"	15'- 0"	10'- 0"	49'- 6"	1'- 3"	1'- 3"	1'- 3"	1'- 0"
30'- 0"	10'- 0"	5'- 0"	33'- 7"	1'- 0"	1'- 0"	1'- 0"	0'-10"
30'- 0"	10'- 0"	10'- 0"	33'- 7"	1'- 0"	1'- 0"	1'- 0"	0'-10"
30'- 0"	15'- 0"	5'- 0"	49'-10"	1'- 4"	1'- 4"	1'- 4"	1'- 1"
30'- 0"	15'- 0"	10'- 0"	49'-10"	1'- 4"	1'- 4"	1'- 4"	1'- 1"

NOTES:

1. DIMENSIONS ARE IN FEET.
2. WATER LEVEL SHOWN IS ASSUMED DESIGN FLOW LEVEL.
3. DESIGN ASSUMES THAT AREAS OF SOFT GROUND BELOW FOUNDATION ARE TREATED BEFORE CONSTRUCTION.
4. MINIMUM CLEARANCE FROM DESIGN FLOW LEVEL TO SOFFIT SHALL BE 2'-0".
5. MINIMUM DIMENSION "Y" FROM TOP OF RAIL TO TOP OF STRUCTURE SHALL BE 6'-0".

10 0 10 20
1"-10'

REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY M. FISHER
DRAWN BY F. PALERMO
CHECKED BY A. ARMSTRONG
IN CHARGE R. COFFIN
DATE 02/12/14

PROPOSED PRELIMINARY DESIGN

NOT FOR CONSTRUCTION

URS | HMM | ARUP
CALIFORNIA HIGH-SPEED TRAIN

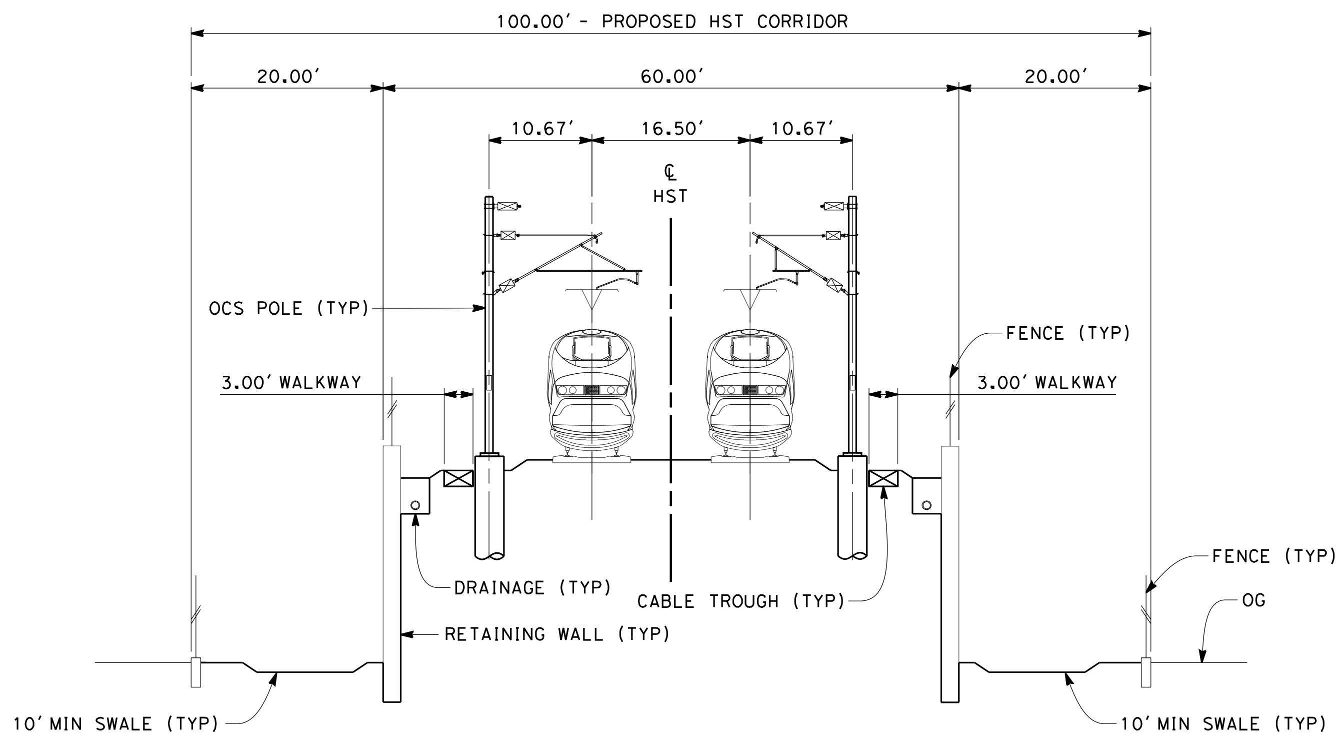
CALIFORNIA
HIGH-SPEED RAIL AUTHORITY

CALIFORNIA HIGH-SPEED TRAIN PROJECT
FRESNO TO BAKERSFIELD
BOX CULVERT
TYPICAL DETAILS
SHEET 1

CONTRACT NO. HSR 06-0003
DRAWING NO. ST-J5001
SCALE AS SHOWN
SHEET NO.

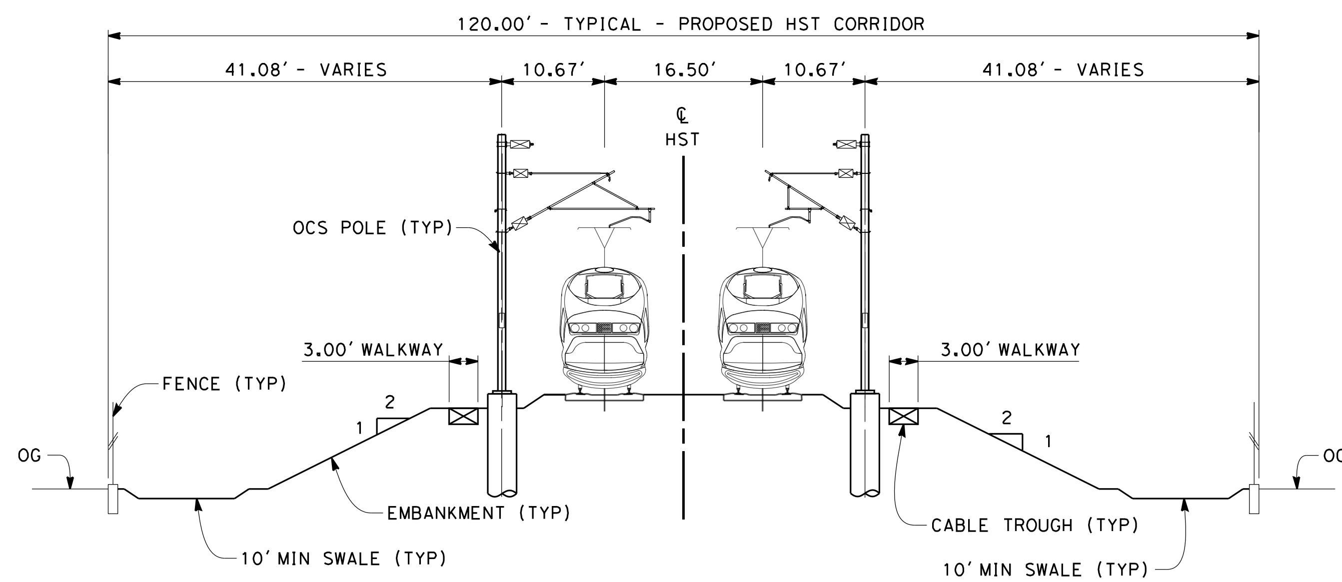
NOTES:

1. TRACKFORM SHOWN IS INDICATIVE
2. FOR STRUCTURE DIMENSIONS SEE STRUCTURAL CROSS SECTIONS
3. SUPERELEVATION IS NOT SHOWN IN CROSS SECTIONS. FOR DETAILS OF SUPERELEVATION SEE CURVE TABLES.



SECTION 5

TWIN TRACK - RETAINED EMBANKMENT WITH OPEN DRAINAGE
STA 1156+20 THROUGH STA 1173+50
STA 1452+50 THROUGH STA 1464+77
STA 1466+90 THROUGH STA 1479+68
STA 1596+52 THROUGH STA 1622+50
STA 1885+40 THROUGH STA 1903+57
STA 2008+37 THROUGH STA 2023+48



SECTION 6

TWIN TRACK - EMBANKMENT WITH OPEN DRAINAGE
STA 1173+50 THROUGH STA 1452+50
STA 1622+50 THROUGH STA 1885+40
STA 2023+48 THROUGH STA 2144+63

10 0 10 20
1"=10'

RFP No.: 13-57 – Addendum No. 5 - 10/09/2014

$USER$ $DATE$ $TIME$ $FILE$

REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY A. POLING
DRAWN BY J. BORGHESI
CHECKED BY K. SEYMOUR
IN CHARGE R. COFFIN
DATE 10/11/13

DRAFT 15% DESIGN SUBMISSION - NOT FOR CONSTRUCTION

URS | HMM | ARUP California High-Speed Train

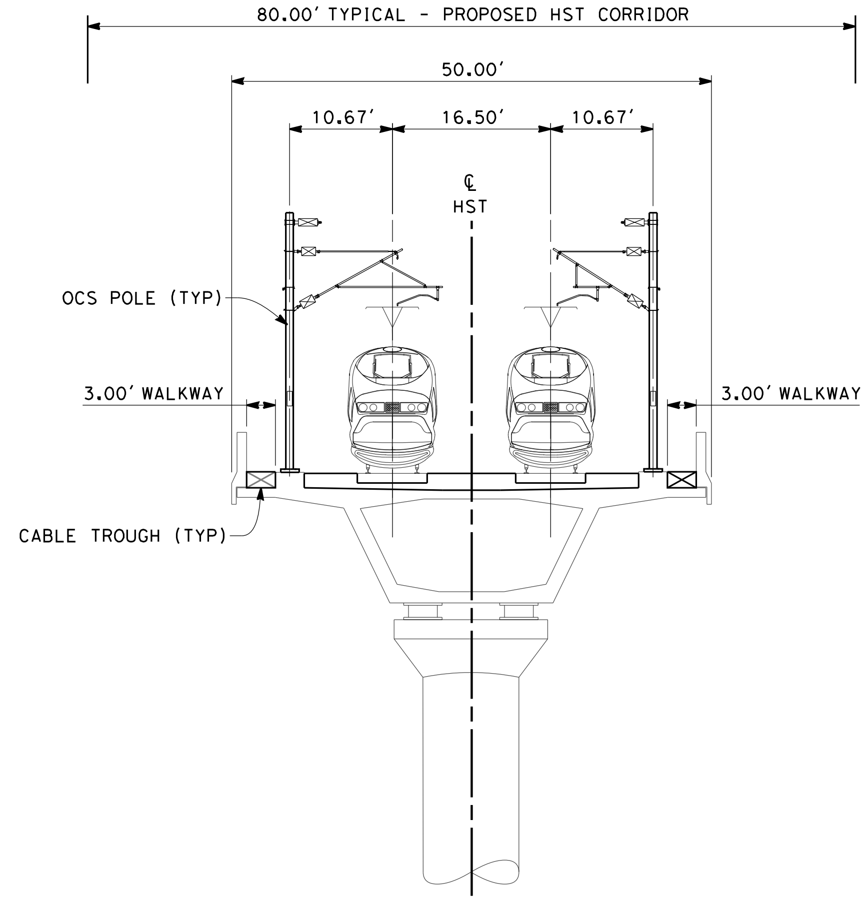
CALIFORNIA HIGH-SPEED RAIL AUTHORITY

CALIFORNIA HIGH-SPEED TRAIN PROJECT
FRESNO TO BAKERSFIELD
HANFORD SUBSECTION
ALIGNMENT H
CROSS SECTIONS

CONTRACT NO. HSR 06-0003
DRAWING NO. CB3153
SCALE AS SHOWN
SHEET NO. 28 OF 31

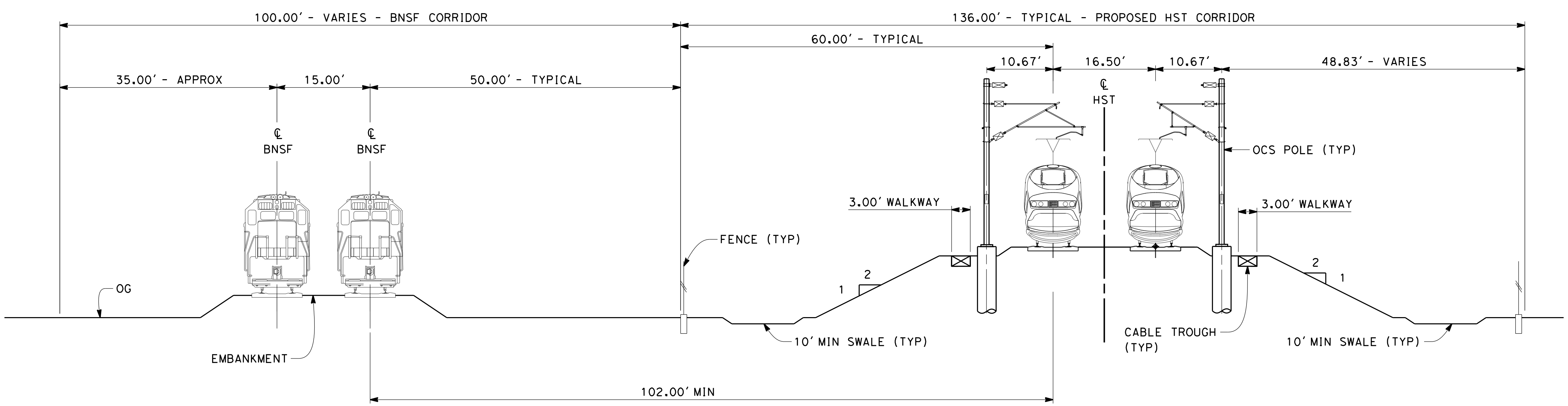
NOTES:

1. TRACKFORM SHOWN IS INDICATIVE.
2. FOR STRUCTURE DIMENSIONS SEE STRUCTURAL CROSS SECTIONS.
3. SUPERELEVATION IS NOT SHOWN. THE AMOUNT OF APPLIED SUPERELEVATION IS SHOWN IN THE CURVE DATA TABLES.



SECTION 13

TWIN TRACK - AERIAL VIADUCT
STA 442+62 THROUGH STA 478+75
STA 487+26 THROUGH STA 503+30



SECTION 14

TWIN TRACK ADJACENT TO SINGLE TRACK BNSF
STA 544+35 THROUGH STA 627+07

10 0 10 20
1"=10'

REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY A. POLING
DRAWN BY P. TONKIN
CHECKED BY K. SEYMOUR
IN CHARGE R. COFFIN
DATE 10/11/13

DRAFT 15% DESIGN SUBMISSION - NOT FOR CONSTRUCTION

URS | HMM | ARUP
California High-Speed Train

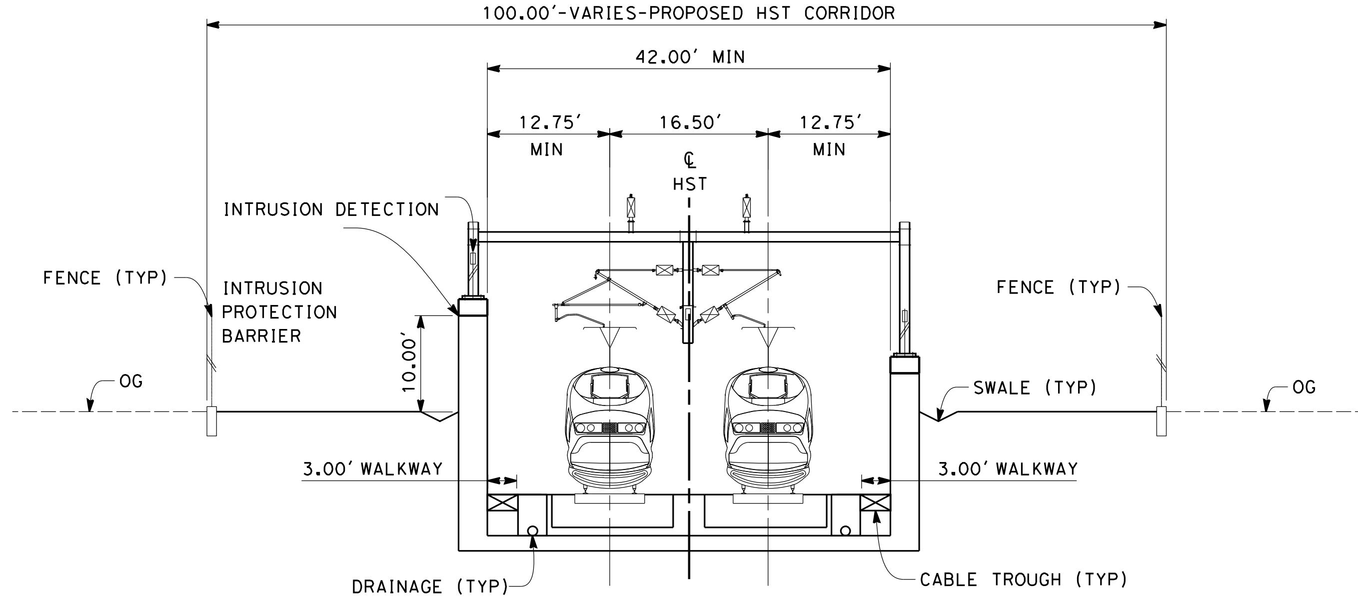
CALIFORNIA HIGH-SPEED RAIL AUTHORITY

CALIFORNIA HIGH-SPEED TRAIN PROJECT
FRESNO TO BAKERSFIELD
FRESNO SUBSECTION
ALIGNMENT F1
CROSS SECTIONS

CONTRACT NO. HSR 06-0003
DRAWING NO. CB3016
SCALE AS SHOWN
SHEET NO. 24 OF 24

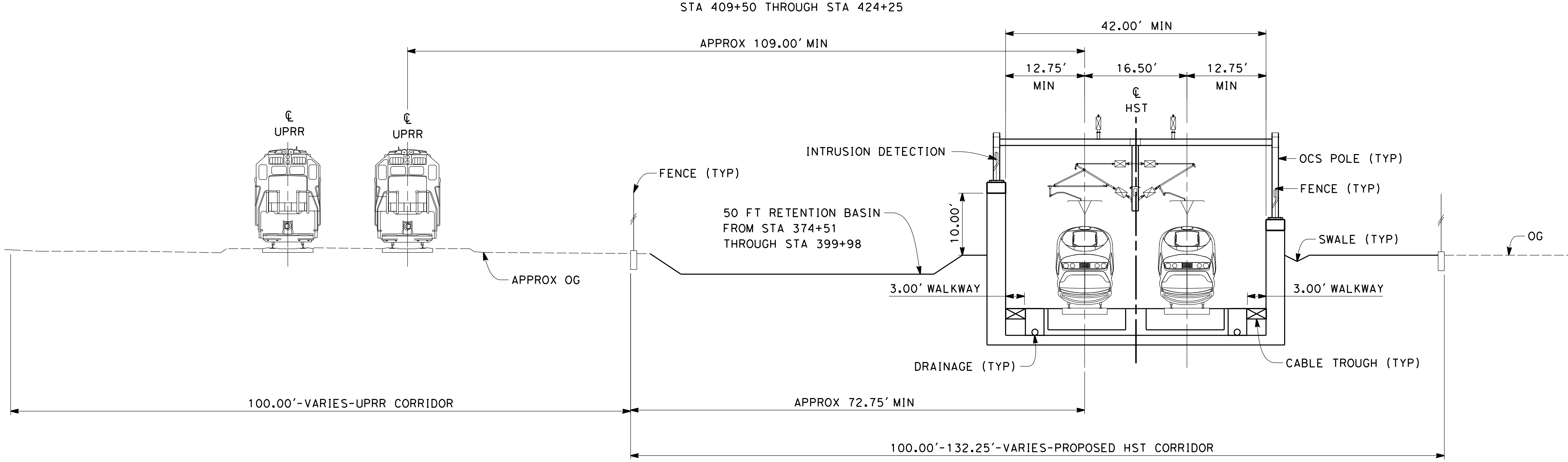
NOTES:

1. TRACKFORM SHOWN IS INDICATIVE
2. FOR STRUCTURE DIMENSIONS SEE STRUCTURAL CROSS SECTIONS
3. SUPERELEVATION IS NOT SHOWN. THE AMOUNT OF APPLIED SUPERELEVATION IS SHOWN IN THE CURVE DATA TABLES



SECTION 7

TWIN TRACK - TRENCH
STA 356+65 THROUGH STA 373+75
STA 400+75 THROUGH STA 408+00
STA 409+50 THROUGH STA 424+25



SECTION 8

TWIN TRACK - TRENCH ADJACENT TO UPPR
STA 373+50 THROUGH STA 400+75

10 0 10 20
1"=10'

REV	DATE	BY	CHK	APP	DESCRIPTION

DESIGNED BY A. POLING
DRAWN BY P. TONKIN
CHECKED BY K. SEYMOUR
IN CHARGE R. COFFIN
DATE 10/11/13

DRAFT 15% DESIGN SUBMISSION - NOT FOR CONSTRUCTION

URS | HMM | ARUP
California High-Speed Train

CALIFORNIA HIGH-SPEED RAIL AUTHORITY

CALIFORNIA HIGH-SPEED TRAIN PROJECT
FRESNO TO BAKERSFIELD
FRESNO SUBSECTION
ALIGNMENT F1
CROSS SECTIONS

CONTRACT NO. HSR 06-0003
DRAWING NO. CB3013
SCALE AS SHOWN
SHEET NO. 21 OF 24

paul.tonkin 10/9/2013 9:46:14 PM c:\pwworking\hmm\external\paul.tonkin01-arup.com\d0125323\FB-CB-3013-F1.dgn

RFP No.: 13-57 – Addendum No. 5 - 10/09/2014

Attachment 3

Fresno to Bakersfield Section Post-Construction Stormwater Quality Standards and Water Quality Technical Report

Table of Contents

Figures

This page intentionally left blank

1.0 Purpose

The purpose of this technical memorandum is to provide the selection criteria and design standards that will be used for post-construction stormwater best management practices (BMPs) for the Fresno to Bakersfield Section of the California High-Speed Train (HST) System. It is anticipated that the post-construction BMP design standards presented in this technical memorandum will be adopted as part of the federal Clean Water Act (CWA) Section 401 Water Quality Certification for Permitting Phase 1 (PP1) of the Fresno to Bakersfield Section.

The requirements here incorporate the substantive water treatment and hydromodification objectives of the Caltrans National Pollutant Discharge Elimination System (NPDES) Statewide Storm Water Permit (Order No. 2012-0011-DWQ, effective July 1, 2013), with modifications appropriate for the HST System. This approach will meet or exceed the treatment and hydromodification control requirements of Section XIII of the NPDES General Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activities (Construction General Permit [CGP], Order No. 2009-0009-DWQ as modified by 2010-0014-DWQ) (California State Water Resources Control Board [SWRCB] 2009). It will also meet or exceed the treatment and hydromodification control requirements needed for compliance with the standards of any active Phase 1 or Phase 2 permit applicable in those areas of the Fresno to Bakersfield Section with active Municipal Separate Storm Sewer System (MS4) permits (SWRCB 2013).

It is further anticipated that these BMP design standards will be implemented during the design/build (D/B) phase of the Fresno to Bakersfield Section as the basis for compliance with CGP Section XIII, the Section 401 Certification, and, when adopted, with the CWA Section 402 statewide NPDES permit for HST operations. HST operations are anticipated to begin in 2019. Consistent with CWA Section 402, the Fresno to Bakersfield Section will include implementation of controls to reduce the discharge of pollutants to the maximum extent practicable (MEP). This technical memorandum represents the culmination of efforts of a technical working group (TWG), which was composed of the regional consultants, the California High-Speed Rail Authority Program Management Team, and the SWRCB.

2.0 Background

2.1 Project Description

The California High-Speed Rail Authority (Authority) and Federal Railroad Administration (FRA) propose to construct and operate a rail line to support an intercity HST system. The California HST project will be constructed in phases and eventually connect San Francisco and Los Angeles and encompass 800 miles, including extensions to Sacramento and San Diego. The HST System is envisioned as an electrically powered, high-speed, steel-wheel-on-steel-rail technology with state-of-the-art safety, signaling, and automated train-control systems. The trains will be capable of operating at speeds of up to 220 miles per hour over a fully grade-separated, dedicated track alignment. The final project will consist of nine separate sections, each of which may be constructed in phases, and each of which can function independently but which, joined together, will create a large, statewide HST System.

The construction of PP1 in the Fresno to Bakersfield Section is planned to commence in fall 2014 and will include the area from south of the Fresno Station in the city of Fresno (in Fresno County) to 7th Standard Road in the unincorporated community of Crome (in Kern County). The Authority is seeking agency approvals for this initial construction and operation of PP1 of the Fresno to Bakersfield Section.

PP1 will be built using a D/B approach, which is a method of project delivery where one entity works under a single contract with the project owner to provide final design and construction services. The contract with the D/B contractor will require compliance with standard development practices and regulations, as well as implementation of any project design features and all applicable conservation measures, mitigation measures, and permit conditions. A detailed project description of PP1 of the Fresno to Bakersfield Section is provided with the Section 401 water quality certification application.

2.2 Existing Regulatory Setting

For construction of the Fresno to Bakersfield Section, the relevant regulations related to stormwater quality are promulgated by the SWRCB and the Central Valley Regional Water Quality Control Board (CVRWQCB). In addition, local agencies, including the following agencies, have adopted implementation procedures and rules to ensure that stormwater quality and flow are controlled as required by law: Fresno Metropolitan Flood Control District (FMFCD), Central Valley Flood Protection Board (CVFPB), Fresno Irrigation District (FID), and California Department of Transportation (Caltrans). While each agency has various adopted rules and procedures to protect and control water quality and storm flows as required by the CWA and the California Porter Cologne Water Quality Act, the SWRCB will assert jurisdiction over HST post-development stormwater controls because (1) the SWRCB has an interest in standardizing water quality protection requirements applicable to the HST to aid in the enforcement of, and the Authority's compliance with, such requirements; (2) the HST System is a project of statewide importance; and (3) the SWRCB is charged with ultimate responsibility for issuance of water quality certifications in accordance with provisions of Section 401 of the Clean Water Act.

Within the city of Fresno, stormwater is managed by both the FMFCD and the Department of Public Works, subject to the existing MS4 NPDES permit (Order No. R5-2013-0080) (CVRWQCB 2013a) (the Fresno MS4 permit) issued pursuant to the CWA. For local new development, the City of Fresno reviews and permits grading and drainage improvements in accordance with the MS4 NPDES permit to ensure that private drainage systems are designed to minimize impacts on water quality and regional flood control objectives. FMFCD is responsible for operations and maintenance of regional drainage facilities, including pipes, channels, and infiltration/detention facilities.

Kern County, including the City of Bakersfield, is permitted to discharge urban stormwater in accordance with the existing MS4 NPDES permit (Order No. R5-2013-0153) (CVRWQCB 2013b). The majority of stormwater runoff in the Bakersfield metropolitan area is directed to retention basins, with a small amount of runoff directed to Kern River or canals. Detention basins treat approximately 80 percent of the stormwater from urbanized areas to help meet water quality objectives. New developments are generally required to include retention or detention basins. Building permits continue to include stormwater control provisions and to ensure compliance with the requirements of the general permits for the discharge of stormwater associated with industrial and construction activities.

Outside of Fresno and Bakersfield, the HST alignment and components of the Fresno to Bakersfield Section will be located generally in sparsely populated areas, with the exception of the cities of Hanford, Corcoran, Wasco, and Shafter. Stormwater management in Hanford, Wasco, and Tulare County is covered by a new Phase II Small MS4 General NPDES Permit (SWRCB 2013). Outside of these cities, there is presently no coverage under an existing MS4 permit. Post-construction stormwater standards in sparsely populated areas are now required for new projects as a condition of compliance with the CGP. Further, as phases of the HST System are constructed, the project will traverse many water board regions and a multiplicity of local jurisdictions. Pursuant to California Water Code Section 13160, the SWRCB is:

(a) authorized to give any certificate or statement required by any federal agency pursuant to any such federal act that there is reasonable assurance that an activity of any person subject to the jurisdiction of the state board will not reduce water quality below applicable standards, and

(b) authorized to exercise any powers delegated to the state by the Federal Water Pollution Control Act (33 United States Code §§ 1251, et seq.)

The SWRCB will therefore administer both the federal CWA Section 401 water quality certifications and the Section 402 post-development NPDES discharge permit for all sections and facilities of the HST System.

2.3 Other NPDES Permits

The following NPDES permits have recently been adopted by the SWRCB. The TWG considered them, as well as the Fresno MS4 permit, to be the state-of-the-science in terms of stormwater management. These permits have similar requirements for implementing low-impact development (LID) BMPs and hydromodification controls.

- CGP (Order No. 2009-0009-DWQ as modified by Order No. 2010-0014-DWQ, NPDES No. CAS000002, adopted September 2, 2009, effective July 1, 2010) (SWRCB 2009).
- Caltrans Statewide Storm Water Permit (Order No. 2012-0011-DWQ, adopted September 19, 2012, effective July 1, 2013) (SWRCB 2012) (Caltrans Permit).
- Phase II Small MS4 General Permit (adopted February 5, 2013, effective July 1, 2013) (SWRCB 2013).

Through consultation with the SWRCB, the TWG recommended that the most appropriate stormwater BMP design standards for the Fresno to Bakersfield Section should be based on the recent Caltrans statewide stormwater permit. This is an appropriate model for post-construction stormwater management (i.e., water quality treatment and hydromodification) because Caltrans' facilities are the most analogous to HST System facilities for the following reasons:

- Both conduct linear transportation operations along long, narrow stretches of right-of-way that traverse multiple watersheds.
- The pollutants of concern in runoff from HST facilities will be substantially similar to those in runoff from other statewide transportation facilities, while pollutant concentrations may vary. Pollutants expected from HST guideway and stations include nutrients, metals, sediments, pesticides and herbicides, and oils and grease. Fugitive dust from the surrounding agricultural areas might contribute additional minor amounts of pollutants such as pesticides and herbicides. Maintenance facilities might contribute metals, oils, grease, solvents, and cleaning agents. These pollutants are similar to Caltrans' Targeted Design Constituents.
- Conversion of existing land uses to essentially impervious land uses for rail transportation has potential water quality and hydromodification impacts that are similar to highway transportation developments. For example, construction of elevated guideways, retained fill, and HST stations would require large impervious areas. Even at-grade rail on ballast may be expected to be somewhat impervious due to even grading and high-compaction requirements for the base material (Regional Transportation District 2011).
- Non-rail HST facilities, such as parking lots at stations and maintenance facilities, are similar to Caltrans' non-highway facilities, such as park-and-ride lots and maintenance facilities.

Therefore, land use and water quality impacts are anticipated to be similar, and the TWG deems the Caltrans permit treatment and hydromodification control standards to be a reasonable model for the Authority.

3.0 Compliance with Section 402 of the Clean Water Act

3.1 Construction Phase

During construction, the Authority will be subject to the requirements of the CGP, as amended or reissued, and the Section 401 Water Quality Certification. In general, the CGP will drive construction-phase BMPs and monitoring, whereas the Section 401 water quality certification (and this technical memorandum) will drive the selection and design of post-construction BMPs in accordance with the treatment and hydromodification control standards of the Caltrans permit that meet or exceed the requirements of Section XIII of the CGP. The anticipated statewide HST post-development NPDES permit will also describe post-construction treatment and hydromodification control standards consistently with this technical memorandum, as well as operational BMPs and source controls and BMP maintenance and monitoring requirements applicable during project operations.

3.2 Post-Construction and Operations Phase

While HST operations will not begin until 2019, the D/B contractors are anticipated to close out portions of the construction site earlier. The first notice of termination (NOT) for coverage under the CGP is expected to be filed as early as fall 2014 (in the Merced to Fresno Section). Once the NOT is approved by the SWRCB, further stormwater discharges from the HST right-of-way must comply with CWA Section 402; however, at this time there is no existing Section 402 Permit coverage for the California HST Project. To resolve this, the Authority and the SWRCB will develop and adopt a new statewide post-development NPDES permit for the California HST Project based on this technical memorandum.

The process to develop and adopt a statewide NPDES permit for the Authority is expected to take substantial time, including completion of internal review by the Authority and SWRCB, as well as a public review and comment period. To meet the anticipated first NOT date, the process to develop the statewide permit should begin, and the Authority must file a Report of Waste Discharge applying for a Section 402 Permit as soon as possible. It is anticipated that a statewide Section 402 General NPDES Permit for post-development discharges of stormwater will ultimately be issued for the California HST System with terms and conditions substantially similar to those set forth in this technical memorandum as be incorporated into the 401 Certification for PP1.

4.0 Water Quality Management Plan

The Authority will implement all water quality measures as described in this technical memorandum, which will be referenced in, and incorporated into, the requirements of the Section 401 Water Quality Certification for PP1. To establish compliance with this technical memorandum, the Section 401 Water Quality Certification, CGP Section XIII, and, when adopted, the Section 402 NPDES post-development stormwater discharge permit, the D/B contractor will prepare, on behalf of the Authority, and submit to the SWRCB for review and approval, a post-development water quality management plan (WQMP). This WQMP will comply with this technical memorandum, including Appendix A, the Water Quality Technical Report (WQTR), for the Fresno to Bakersfield Section. Submittal and approval by the SWRCB will standardize the application of these criteria for the Fresno to Bakersfield Section, and, in the future, for other HST sections. No local agency review will be required.

The post-development WQMP will provide detailed, site-specific, and facility-specific information about the water quality measures to be implemented in that development area at the project level, including site design, source control, LID, treatment control, and hydromodification control BMPs to manage wet-weather and dry-weather water quality and quantity by limiting or managing pollutant sources and changes in flow volumes, rates, velocities, and shear stresses.

The post-development WQMP will be prepared by the D/B contractor on behalf of the Authority and will include at a minimum:

- Table of contents.
- Vicinity map.
- Project description.
- Receiving waters and beneficial uses.
- Pollutants and conditions of concern.
- Methodology and standards for selection of BMPs.
- Site design (design pollution prevention) BMPs.
- Source control BMPs and their consistency with WQMP requirements and standards.
- LID treatment BMPs and their consistency with WQMP requirements and standards.
- Hydromodification requirements and their consistency with WQMP requirements and standards.
- Drainage study.
- Site map with the drainage study and BMP plan.
- Requirements for operation and maintenance of BMPs.

5.0 Post-Construction Stormwater Treatment Control Standards

The Authority will adopt the post-construction treatment control standards for the Fresno to Bakersfield Section, as described below.

5.1 Design Pollution Prevention BMPs

The following source control/design pollution prevention (DPP) BMPs will be incorporated into all projects that create a disturbed soil area (DSA), including projects designed to meet the post-construction treatment requirements listed below:

- Conserve natural areas, to the extent feasible, including existing trees, stream buffer areas, vegetation, and soils.

- Minimize the impervious footprint of the project.

- Minimize disturbances to natural drainages.

- Design and construct pervious areas to effectively receive runoff from impervious areas, taking into consideration the previous area's soil conditions, slope, and other pertinent factors.

- Implement landscape and soil-based BMPs such as compost-amended soils and vegetated strips and swales.

- Use climate-appropriate landscaping that minimizes irrigation and runoff, promotes surface infiltration, and minimizes the use of pesticides and fertilizers.

- Design all landscapes to comply with the California Department of Water Resources Water Efficient Landscape Ordinance[1] (California Department of Water Resources 2013). Where this ordinance conflicts with a local water conservation ordinance, the department will comply with the local ordinance.

5.2 Projects Subject to Post-Construction Treatment Requirements

Post-construction treatment control requirements will apply to the Fresno to Bakersfield Section, including under the following conditions:

- Rail facilities that create 1 acre, or more, of soil disturbance.
- Non-rail facilities that create 5,000 square feet, or more, of soil disturbance.

Rail facilities are defined as the linear features of the Fresno to Bakersfield Section, including rail line, footprint, at-grade embankment, elevated structures, and project facilities. Non-rail facilities include associated facilities such as stations, traction-power substations, switching and paralleling stations, maintenance-of-way facilities, heavy maintenance facilities, overcrossings and interchanges, and local roadway modifications.

The Authority will also implement post-construction treatment control BMPs for the following projects that are required to be constructed to accommodate HST improvements but that will be constructed outside the HST right-of-way. These “non-Authority” projects comprise improvements to existing facilities or new developments that will be owned by other agencies after construction (e.g., frontage road improvements for the Avenue 15 interchange in Madera County). For these non-Authority projects, the Authority will exercise the following control:

- The Authority will exercise control or oversight over projects that have impacts on Authority right-of-way, but which are sponsored by other agencies, through encroachment permits or other means. This will apply to projects that other agencies will build that affect HST right-of-way, and is analogous to Caltrans’ encroachment permit approach.

- Non-Authority development or redevelopment projects will be subject to the same post-construction treatment control requirements as Authority projects. This will apply to projects constructed as part of a larger HST project, but which will be transferred to another agency after construction.

- For all non-Authority projects that trigger post-construction treatment control requirements within another MS4 permit jurisdiction, the Authority will review and approve the design of post-construction treatment controls and BMPs before implementation. This will apply to projects constructed as part of a larger HST project, but which will be transferred to another agency after construction—for example, local roadway improvements within the Fresno MS4 jurisdiction.

5.3 Numeric Sizing Criteria for Stormwater Treatment Control BMPs

Treatment control BMPs constructed for Authority and non-Authority projects will be designed to treat the entire runoff volume or flow from an 85th percentile 24-hour storm event according to the following priorities (in order of preference):

[1] See http://www.water.ca.gov/wateruseefficiency/landscapeordinance/technical.cfm.

1. Infiltrate, harvest and re-use, and/or evapotranspire the design volume or flow of stormwater runoff.

2. Capture and treat the design volume or flow of stormwater runoff.

This 85th percentile 24-hour storm event sizing criterion will apply to the entire treatment train within the project's construction footprint. DPP BMPs may be used to comply with this requirement. Where these DPP BMPs are used for treatment but also provide incidental volume reduction, the Authority may also receive credits for these volume reductions for the purpose of providing hydromodification control.[2]

In the event the entire runoff volume from an 85th percentile 24-hour storm event cannot be infiltrated, harvested and re-used, or evapotranspired, the excess volume may be treated by LID-based flow-through treatment devices. Examples of LID-based flow-through treatment devices are biofiltration swales and strips enhanced by compost amendment or an equivalent technique to increase soil storage of runoff and improve infiltration and evapotranspiration. For example, where biofiltration swales are incorporated to provide runoff treatment or as DPP BMPs, the infiltration capacity of these swales may be estimated using Caltrans' infiltration estimating tools (Caltrans 2013). In areas with poorly draining native soils, the infiltration capacity may be limited without amendments. Check dams may be used within ordinary or compost-amended biofiltration swales to maximize volume capture to meet the CGP standard to replicate the pre-project water balance (see CGP, Section XIII).

Where LID-based flow-through treatment devices are not feasible, the excess volume may be treated through conventional volume-based or flow-based stormwater treatment devices. Examples of such devices can be found in the Caltrans Project Planning and Design Guide (2010) and California Stormwater Quality Association *Stormwater Best Management Practice Handbook, New Development and Redevelopment* (2009).

Applying this approach will meet the standard of mitigating for incidental changes in runoff volume from onsite tributary areas. The selection and implementation of specific BMPs for purposes of protecting receiving-water channel stability are discussed in Section 6 of this memorandum, Hydromodification Requirements. The Authority will always prioritize the use of landscape and soil-based BMPs to treat stormwater runoff. Other BMPs may be used only after landscape and soil-based BMPs are determined to be infeasible. As the state of BMP technology advances, the Authority may consider other effective stormwater treatment control methods or devices for approval.

5.4 Scope of Design Criteria Applicability

Design criteria will depend upon whether the additional soil disturbance is part of an Authority or non-Authority project, or if onsite treatment of the new stormwater flow is infeasible and therefore requires alternative compliance.

5.4.1 Authority Facilities

For Authority facilities, where a project results in an increase in impervious area that is less than or equal to 50 percent of the total post-project impervious area within the construction footprint, the numeric sizing criteria will only apply to runoff from the new impervious area and not to the entire project.

[2] It may be possible for DPP BMPs to achieve enough incidental volume reduction to meet the hydromodification control standards of Section XIII of the CGP without substantial additional costs or BMPs.

1. If the project's impervious area cannot be hydraulically separated from the existing impervious area, the Authority will either provide treatment for the project's impervious area and as much of the hydraulically inseparable flow as feasible based on site conditions and constraints, or identify treatment opportunities equivalent to the project's impervious area.

2. If it is not possible to separate the flows from the project areas from the existing impervious area, the treatment system will be designed to treat as much of the hydraulically inseparable flow as feasible and will bypass or divert any excess around the treatment device. The purpose of this requirement is to prevent overloading the treatment device and impairing its performance.

3. Where a project results in an increase in impervious area that is greater than 50 percent of the total post-project impervious area within the construction footprint, the numeric sizing criteria will apply to runoff from the entire project.

5.4.2 Non-Authority Facilities

For non-Authority facilities, such as those constructed for other entities, where a project results in an increase in impervious area that is less than or equal to 50 percent of the total post-project impervious area of an existing development, the numeric sizing criteria will only apply to runoff from the new impervious area and not to runoff from the entire project.

1. If the project's impervious area cannot be hydraulically separated from the existing impervious area, the Authority will either provide treatment for existing and project areas or identify treatment opportunities equivalent to the project area.

2. Where a project results in an increase in impervious area that is greater than 50 percent of the total post-project impervious area of an existing development, the numeric sizing criteria will apply to the entire project.

5.4.3 Direct Connections to Fresno FMFCD Storm Drainage System

Where HST facilities will drain directly to the existing FMFCD storm drainage system DPP BMPs will be implemented, wherever feasible, to provide pre-treatment. Treatment BMPs are not required because the drainage system managed by FMFCD uses regional infiltration basins to manage stormwater runoff. Instances in which these DPP BMPs also provide incidental hydromodification benefits prior to discharge to the FMFCD facility will be documented in the WQMP (see Section 7 below). Therefore, treatment and hydromodification objectives are met and no further BMPs are required.

5.4.4 Alternative Compliance for Infeasible Onsite Treatment

It may be infeasible to infiltrate, harvest and re-use, and/or evapotranspire the design volume or flow of stormwater runoff onsite due to physical, construction, or operational constraints, including the following:

- Where these stormwater BMPs would not fit within the available HST right-of-way and where additional right-of-way may not reasonably be acquired to implement infiltration devices.

- The BMP is located within 15 feet of a structure or structural foundation.

- Seasonally high groundwater or mounded groundwater is less than 5 feet below the designed bottom of the infiltration facility.

- Existing soils preclude rapid infiltration (e.g., hydrologic soil Group D soils, or soils with measured percolation rates less than 0.3 inch per hour) after accounting for soil amendments.

- Seasonally high groundwater or mounded groundwater is less than 10 feet below the designed bottom of the infiltration facility and significant treatment is not provided in the BMP before groundwater injection.

- The BMP is less than 100 feet horizontally from a water supply well, nonpotable well, drain field, or spring.

- The BMP tributary area contains high-risk land use activities that would result in significant risks of pollutant contribution to drinking water quality and groundwater quality that cannot be reasonably and technically mitigated through methods, such as isolation of sources and/or pre-treatment of runoff, to address pollutants of concern prior to infiltration.

- For brownfield sites or adjacent sites, where stormwater infiltration would result in a significant risk of mobilizing or moving contamination that cannot be reasonably and technically avoided, as documented by a site-specific or available watershed study. The documenting study will have sufficient resolution to positively identify areas of the property where unremediated contamination is located and where stormwater infiltration should be restricted to prevent pollutant mobilization.

- Where a groundwater pollutant plume (man-made or natural) is under the site or close to it and there is substantial evidence that stormwater infiltration would cause or contribute to plume movement that cannot be reasonably and technically avoided, as documented by a site-specific study or available watershed study. The documenting study will have sufficient resolution to positively identify areas where stormwater infiltration should be restricted.

- The location is less than 50 feet away from slopes steeper than 15 percent.

- A study prepared by a geotechnical professional or an available watershed study determine that stormwater infiltration would result in significantly increased risks of geotechnical hazards (e.g., liquefaction, landslide) on or adjacent to the project site that cannot be reasonably and technical mitigated. The documenting study will have sufficient resolution to positively identify locations on a project site where stormwater infiltration should be restricted.

- Where infiltration of runoff from the project would violate downstream water rights. While it is not anticipated that infiltration of runoff would violate water rights, water law in California is complex, and this technical memorandum does not exclude the possibility that a rightful water rights claim could restrict infiltration of stormwater.

- If there is evidence that an increase in infiltration over pre-developed conditions would cause impairments to downstream beneficial uses, such as a change of seasonality of ephemeral washes or an increased discharge of contaminated groundwater to surface waters, the level of allowable increase in infiltration must be documented in a site-specific study or watershed plan, and it must be demonstrated that stand-alone infiltration BMPs would exceed the allowable level of increase in infiltration or what level could be infiltrated as a partial consideration.

- Where there is increased inflow and infiltration to the sanitary sewer that cannot be sufficiently mitigated.

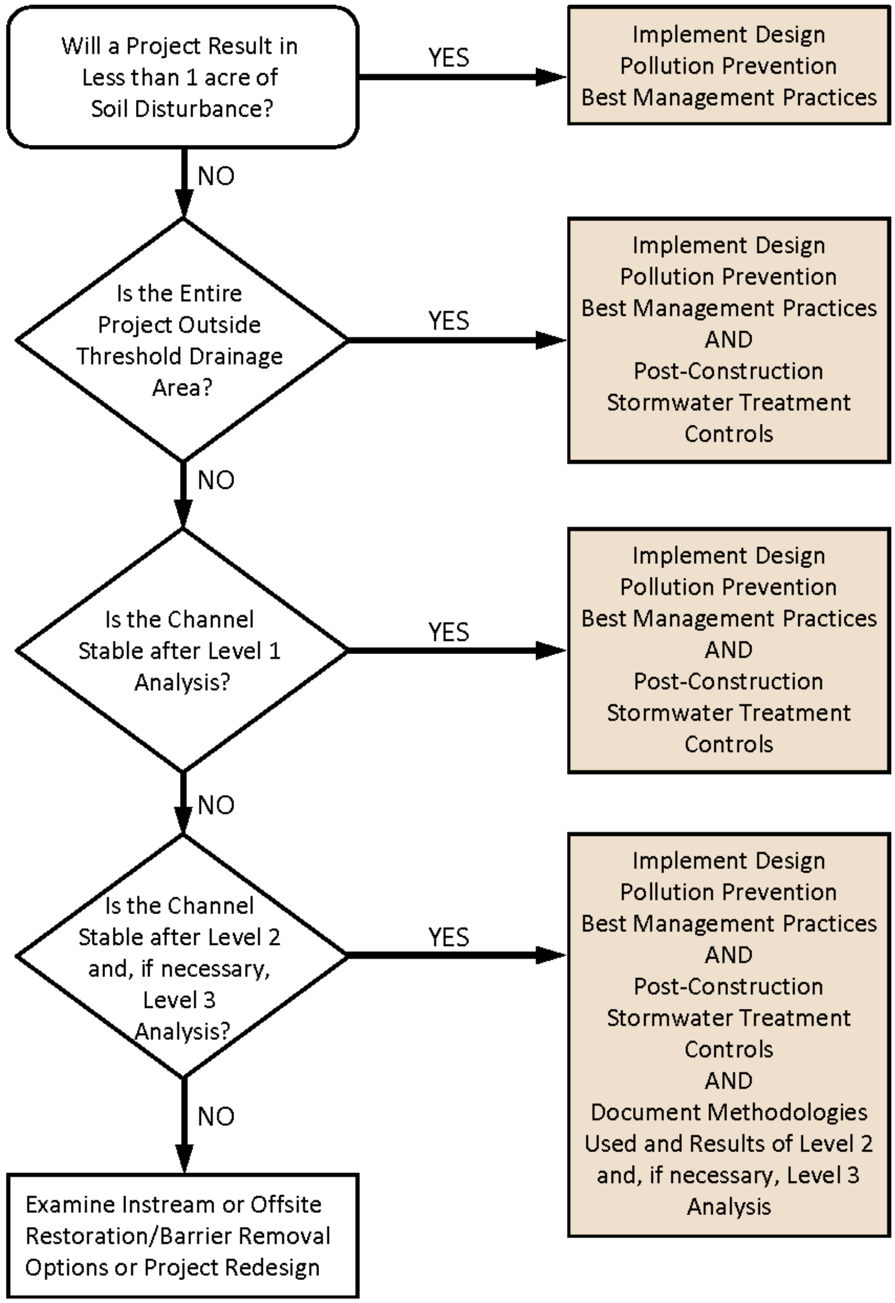
- Where extraordinary construction measures are required to convey runoff toward the BMP (e.g., bored and jacked piping, pump stations, "bucking the grade," or where new storm drainage infrastructure must cross through existing structures or structural foundations).
- Where a BMP would jeopardize human health and safety.
- Where increased construction or operational costs of a BMP itself are excessive in comparison to the treatment benefit it is expected to provide.

If the Authority determines that it is infeasible for all or any portion of the runoff from the 85th percentile 24-hour storm event to be infiltrated, captured and reused, or evapotranspired using onsite BMPs, the Authority will prepare a proposal for alternative compliance for approval by the SWRCB Executive Officer or his designee until such time as a statewide process is approved. The proposal will include documentation supporting the determination of infeasibility. Alternative compliance may be achieved outside the construction footprint but within the HST right-of-way, including within another HST section or Authority project, or within regional or sub-regional facilities owned, operated, and maintained by entities other than the Authority, such as the FMFCD. Alternative compliance to be achieved outside the construction footprint will include provisions for the long-term maintenance of such treatment facilities.

For portions of HST located within FMFCD, the Authority may propose alternative compliance with these standards by entering into an agreement with FMFCD to discharge directly the FMFCD regional infiltration basin systems. Such a plan would be approved as described in Section 7, Exceptions to Post-Construction Stormwater Treatment Control and Hydromodification Standards.

6.0 Hydromodification Requirements

The Authority and its D/B contractors will ensure that the HST project does not cause a decrease in lateral (bank) and vertical (channel bed) stability in receiving stream channels. Unstable stream channels negatively affect water quality by yielding much more sediment than stable channels. The Authority and its D/B contractors will employ the risk-based approach detailed in the following sections to assess and ensure lateral and vertical stability. The approach will help assess pre-project channel stability and implement appropriate mitigation measures to protect structures and minimize stream channel bank and bed erosion. The approach is depicted in Figure 1, and is more protective than the CGP standards because it applies to smaller areas of soil disturbance. The post-development WQMP prepared by the D/B contractor will summarize the results of this approach.



Stream Assessment Analyses (Level 1, 2, and 3) are based on Federal Highway Administration publication Assessing Stream Channel Stability at Bridges in Physiographic Regions (FHWA 2006).

Figure 1
Hydromodification flowchart

1. Rail or non-rail facility projects that disturb between 5,000 square feet and 1 acre of soil area must implement DPP BMPs, as described in the Section 401 Water Quality Certification.

2. Rail or non-rail facility projects that disturb 1 acre, or more, of soil area completely outside of a threshold drainage area must implement DPP BMPs and post-construction stormwater treatment controls. A threshold drainage area is defined as the area draining to a location at least 20 channel widths downstream of a stream crossing (i.e., pipe, swale, culvert, or bridge) within the construction footprint. Delineating the threshold drainage area is not necessary if there are no stream or natural drainage crossings within the construction footprints.

   The project will also be constructed to preserve the pre-construction drainage density (miles of stream length per square mile of drainage area) for all drainage areas within an area serving a first-order stream or larger stream, and to ensure that post-project time of runoff concentration is equal or greater than pre-project time of concentration. To meet the drainage density requirement, the Authority will maximize sheet flow and use an "open" drainage system (i.e., swales, ditches, vegetated channels) for concentrated flows wherever possible. Sheet flow areas, swales, ditches, and vegetated channels are not considered streams for the purpose of calculating drainage density. Because of the nature of the HST project as a linear transportation corridor, it is not anticipated that the Authority will increase the drainage density. Local relocations of existing irrigation channels or natural streams may require new structures to cross the HST. These would not affect stream drainage density.

   To meet the time of concentration requirements, dischargers will use the recommended method in the applicable local hydraulic design or flood-control manual. If a recommended method does not exist, the discharger will use the time of concentration calculation method contained in the Natural Resources Conservation Service's *Technical Release 55: Urban Hydrology for Small Watersheds TR-55* (Natural Resources Conservation Service 1986).

   Hydrology maps should be prepared as part of the post-development WQMP by the D/B contractor to show threshold drainage areas and calculations required for BMP sizing.

3. Rail or non-rail facility projects that disturb 1 acre, or more, of soil area in any portion of the project located within a threshold drainage area must conduct a rapid assessment of natural stream stability (i.e., Level 1 stream assessment) at each stream crossing (i.e., pipe, culvert, swale, or bridge) within that threshold drainage area. If the stream crossing is a bridge, a follow-up rapid assessment of stream stability is also required and can be coordinated with the federally mandated bridge inspection process. The assessment will be conducted within a representative channel reach to assess lateral and vertical stability. A representative reach is a length of stream channel that extends at least 20 channel widths upstream and downstream of a stream crossing. For example, a 20-foot-wide channel would require analyzing a 400-foot distance both upstream and downstream of the discharge point or bridge (800 feet total). If sections of the channel within the 20-channel-width distance are immediately upstream or downstream of steps, culverts, grade controls, tributary junctions, or other features and structures that significantly affect the shape and behavior of the channel, more than 20 channel widths should be analyzed. Guidance and worksheets used for the rapid assessment of stream stability are in the Federal Highway Administration (FHWA) publication *Assessing Stream Channel Stability at Bridges in Physiographic Regions* (FHWA 2006). These will be documented in the post-development WQMP.

4. If the results of the rapid assessment indicate that the representative reach is laterally and vertically stable (i.e., have a rating of excellent or good), the Authority does not have to conduct further analyses and must implement the DPP BMPs and the post-construction stormwater treatment controls, which will be identified conceptually in the WQTR and at a project level in the post-development WQMP.

If the results of the rapid assessment indicate that the representative reach is not laterally and vertically stable (i.e., does not have a rating of excellent or good), the Authority must determine whether the instability, in conjunction with the proposed project, poses a risk to existing or proposed rail structures by conducting appropriate Level 2 (and, if necessary, Level 3) analyses. The Authority will follow the Level 2 and Level 3 analysis guidelines contained in HEC-20 (FHWA 2012), or a suitable equivalent, within an accessible portion of the reach. If the results of the appropriate Level 2 (and, if necessary, Level 3) analyses indicate that there is no risk to existing or proposed rail structures, the Authority must implement the DPP BMPs and the post-construction stormwater treatment controls described in this document and in the WQMP and must document the methodologies used, the results, and the mitigation measures suggested as part of the appropriate Level 2 and, if necessary, Level 3 analyses. If the results of the Level 2 and Level 3 analyses indicate that the instability, in conjunction with the proposed project, poses a risk to existing or proposed structures, other options must be implemented, including, but not limited to, stream bed and bank stabilization required to protect HST structures and other structures affected by the HST project.

7.0 Exceptions to Post-Construction Stormwater Treatment Control and Hydromodification Standards

In general, the Authority will adopt post-construction treatment control and hydromodification control standards, as described above. These standards meet or exceed the requirements of the Caltrans permit and the CGP and are determined by the SWRCB to provide for treatment to the MEP for HST project facilities. However, in specific areas where unique conditions exist, the Authority will have the flexibility to comply with local MS4 requirements.

For example, Fresno County captures most urban runoff in regional stormwater basins. The FMFCD estimates that 90 percent of urban runoff is retained in regional stormwater basins located throughout its permit area. Another 8 percent of the urban runoff is discharged to the San Joaquin River or canals after being detained in stormwater basins, and the remaining 2 percent is discharged directly to the San Joaquin River or canals. In accordance with the Fresno County MS4 permit, retention and/or detention of stormwater in FMFCD stormwater basins is accepted treatment methods and the discharger’s most effective BMPs to remove pollutants from urban runoff. For areas of the Fresno to Bakersfield Section within the jurisdiction of the Fresno MS4 permit, compliance with that permit’s conditions will meet or exceed the post-construction standards in this technical memorandum. The Contractor will develop a treatment BMP strategy and a drainage and BMP plan that uses these regional LID facilities pursuant to the Fresno MS4 permit requirements and will document that in the WQMP. The final WQMP will be submitted for approval to the SWRCB.

8.0 Site-Specific BMP Selection and Implementation

The Fresno to Bakersfield Section will include at-grade structures as well as elevated guideways and bridges. There will be varying terrain and physical constraints such as soil conditions, groundwater, stream crossings, and canals. BMP selection should consider existing infrastructure, such as storm drains and streets, which can limit stormwater collection and treatment, as well as obstructions such as buildings, walls, foundations, and abutments.

Caltrans’ *Project Planning Design Guide* provides guidance on evaluating BMP feasibility. Site-specific conditions can affect operations, maintenance, construction costs, safety, and aesthetics. General criteria used during the evaluation of treatment BMPs include relative effectiveness, technical feasibility, costs and benefits, and legal and institutional constraints.

Sites that require extraordinary plumbing to collect and treat runoff (e.g., jacking operations, bridge deck collection systems) may be considered infeasible because of cost. Where installation of BMPs would require extraordinary construction, such as retaining walls or shoring, these sites may also be infeasible because of their increased construction and operational costs relative to the cost of the BMP itself.

The selection of a BMP should emphasize the following characteristics:

- It should be constructed within the right-of-way or should be a regional or subregional facility operated and maintained by a public agency.
- It should avoid and protect environmentally sensitive areas.
- It should consider hydraulic constraints that may cause stagnant water or other problems with local vector control agencies.
- It should be constructible without requiring major modifications or extraordinary plumbing such as boring and jacking, bucking the grade, or pumping.

The D/B contractor will have the responsibility of evaluating the feasibility of implementing various DPP, treatment, and volume reduction or flow control BMPs to meet post-construction water quality standards and to provide a project-level post-development WQMP that complies with the standards set forth in this technical memorandum and as described in the WQTR attached as Appendix A. A preliminary selection of feasible BMPs is presented in Appendix A.

9.0 Inspection and Maintenance Responsibility for BMPs

9.1 Construction Phase

Stormwater inspection and maintenance reporting requirements will be the responsibility of the D/B contractor on behalf of the Authority during construction. Inspection and maintenance requirements are provided in the CGP.

9.2 Post-Construction and Operations Phase

The D/B contractor will be responsible for stormwater BMP inspection and maintenance after construction (i.e., after NOT) until the Authority accepts the construction project, or any portion thereof, as a completed project. The Authority, or the operating entity for the facility, will be responsible for stormwater BMP inspection and maintenance after Authority acceptance of the project, or any portion thereof, as complete. An operations and maintenance schedule will be prepared as part of the D/B contractor's post-development WQMP. Issuance of the first NOT is anticipated in fall 2014, at which point a statewide NPDES permit for Authority operations, incorporating the treatment and hydromodification control standards and requirements of this technical memorandum, will have been developed that will cover treatment BMP inspection, maintenance, and reporting.

10.0 References

California Department of Transportation (Caltrans). 2010. *Storm Water Quality Handbooks, PPDG Project Planning and Design Guide.* CTSW-RT-10-254.03. Office of Storm Water Management – Design. July, 2010.

———. 2013. *T-1 Checklist Infiltration Tools v. 3.01 User Manual*. CTSW-SA-12-239.09.04. Sacramento, CA. February 28, 2013.

California Department of Water Resources. 2013. *Water Efficient Landscape Ordinance.* Sacramento, CA. http://www.water.ca.gov/wateruseefficiency/landscapeordinance/technical.cfm (accessed May 2013).

California State Water Resources Control Board (SWRCB). 2009. Order No. 2009-0009-DWQ [As Amended by Order No. 2010-0014-DWQ]. National Pollutant Discharge Elimination System General Permit No. CAS000002 Waste Discharge Requirements for Discharges of Storm Water Runoff Associated with Construction and Land Disturbance Activities. Adopted September 2, 2009, as modified on November 16, 2010.

———. 2012. Order No. 2012-0011-DWQ, NPDES No. CAS000003. National Pollutant Discharge Elimination System (NPDES) Statewide Storm Water Permit Waste Discharge Requirements (WDRs) for State of California Department of Transportation. Adopted September 19, 2012, Effective Date: July 1, 2013.

———. 2013. Order No. 2013-0001-DWQ. National Pollutant Discharge Elimination System General Permit No. CAS000004 Waste Discharge Requirements (WDRs) for Storm Water Discharges From Small Municipal Separate Storm Sewer Systems (MS4s) (General Permit). Adopted February 5, 2013, effective July 1, 2013.

California Stormwater Quality Association. 2009. Stormwater Best Management Practice Handbook, New Development and Redevelopment. January 2003, updated September 30, 2004.

Central Valley Regional Water Quality Control Board (CVRWQCB). 2013. Order No. R5-2013-0080, NPDES No. CA0083500. *Waste Discharge Requirements for Fresno Metropolitan Flood Control District, City of Fresno, City of Clovis, County of Fresno, and California State University Fresno, Storm Water Discharges from the Municipal Separate Storm Sewer System, Fresno County.* Adopted May 31, 2013.

———. 2013b. Order No. R5-2013-0153b, NPDES No. CA00883399. *Waste Discharge Requirements for City of Bakersfield and County of Kern Storm Water Discharges from Municipal Separate Storm Sewer System Kern County*. Adopted December 6, 2013.

Federal Highway Administration (FHWA). 2006. *Assessing Stream Channel Stability at Bridges in Physiographic Regions.* Publication No. FHWA-HRT-05-072. July 2006.

———. *Hydraulic Engineering Circular No. 20.* "Stream Stability at Highway Structures, Fourth Edition." Publication No. FHWA-HIF-12-004. April 2012.

Natural Resources Conservation Service. 1986. *Technical Release 55: Urban Hydrology for Small Watersheds, TR-55*. Natural Resources Conservation Service, Conservation Engineering Division, United States Department of Agriculture. June 1986.

Regional Transportation District (Denver, Colorado). 2011. *Final Report: Modeling Ballasted Tracks for Pollutant and C Value for Regional Transportation District, Denver, Colorado*. Prepared by Albert Molinas, Ph.D., Hydrau-Tech, Inc. April, 2011.

This page intentionally left blank

Appendix A
Water Quality Technical Report

Table of Contents

Page

Tables

Figures

A1.0 Purpose

This document provides the procedures for selecting and implementing low-impact development (LID) and other treatment, source, and volume control best management practices (BMPs) for Permitting Phase 1 (PP1) of the Fresno to Bakersfield Section of the of the California High-Speed Train (HST) Project (see Figure A-1). This document also includes design information and stormwater management strategy at the level of detail equivalent to a concept-level water quality technical report (WQTR), including receiving waters, pollutants of concern, and project-site BMP implementation.

BMPs will meet post-construction treatment and hydromodification standards, as documented in the Fresno to Bakersfield Section Post-Construction Stormwater Quality Standards Technical Memorandum (similar to CH2M Hill and URS 2013) and the Section 401 Water Quality Certification. The post-construction stormwater quality standards incorporate the substantive water treatment and hydromodification objectives of the recent Caltrans National Pollutant Discharge Elimination System (NPDES) Statewide Storm Water Permit (Order No. 2012-0011-DWQ, effective July 1, 2012), with modifications appropriate for the HST System. They meet or exceed the requirements of Section XIII of the National Pollutant Discharge Elimination System (NPDES) General Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activities (Construction General Permit, Order No. 2009-0009-DWQ as modified by 2010-0014-DWQ) (State Water Resources Control Board [SWRCB] 2009) and will ultimately assure compliance with the Clean Water Act Section 402 statewide NPDES permit for HST operations, when adopted. While the methods described herein include application of specific treatment strategies, the design/build (D/B) contractor will have the flexibility and discretion to develop a final post-development Water Quality Management Plan (WQMP) with adequate project-level detail to ensure that the design will achieve the mitigation requirements, including the treatment, LID, and hydromodification control standards, specified in the 401 water quality certification, and, ultimately the Section 402 statewide NPDES Permit for HST operations, when adopted.

Through consultation with the SWRCB, the most appropriate stormwater BMP design standards for PP1 should be based on the recent California Department of Transportation Statewide Storm Water Permit (Order No. 2012-0011-DWQ, adopted September 19, 2012, effective July 1, 2013) (SWRCB 2012) (Caltrans Permit). This is an appropriate model for post-construction stormwater management (i.e., water quality treatment and hydromodification) because Caltrans' facilities are the most analogous to HST system facilities: both conduct linear transportation operations along long narrow stretches of right-of-way that traverse multiple watersheds. Also, non-rail HST facilities, such as parking lots at stations and maintenance facilities are similar to Caltrans' non-highway facilities, such as park and ride lots and maintenance facilities. In addition, pollutants of concern associated with HST facilities are similar to those associated with Caltrans facilities. Because the technology proposed for the HST system does not require large amounts of lubricants or hazardous materials for operation and the electric trains will use a regenerative braking technology, resulting in reduced physical breaking and associated wear, the Caltrans permit is a conservative model for the California High-Speed Rail Authority (Authority). These methods will meet the requirements of the existing Fresno MS4 permit (CVRWQCB 2013).

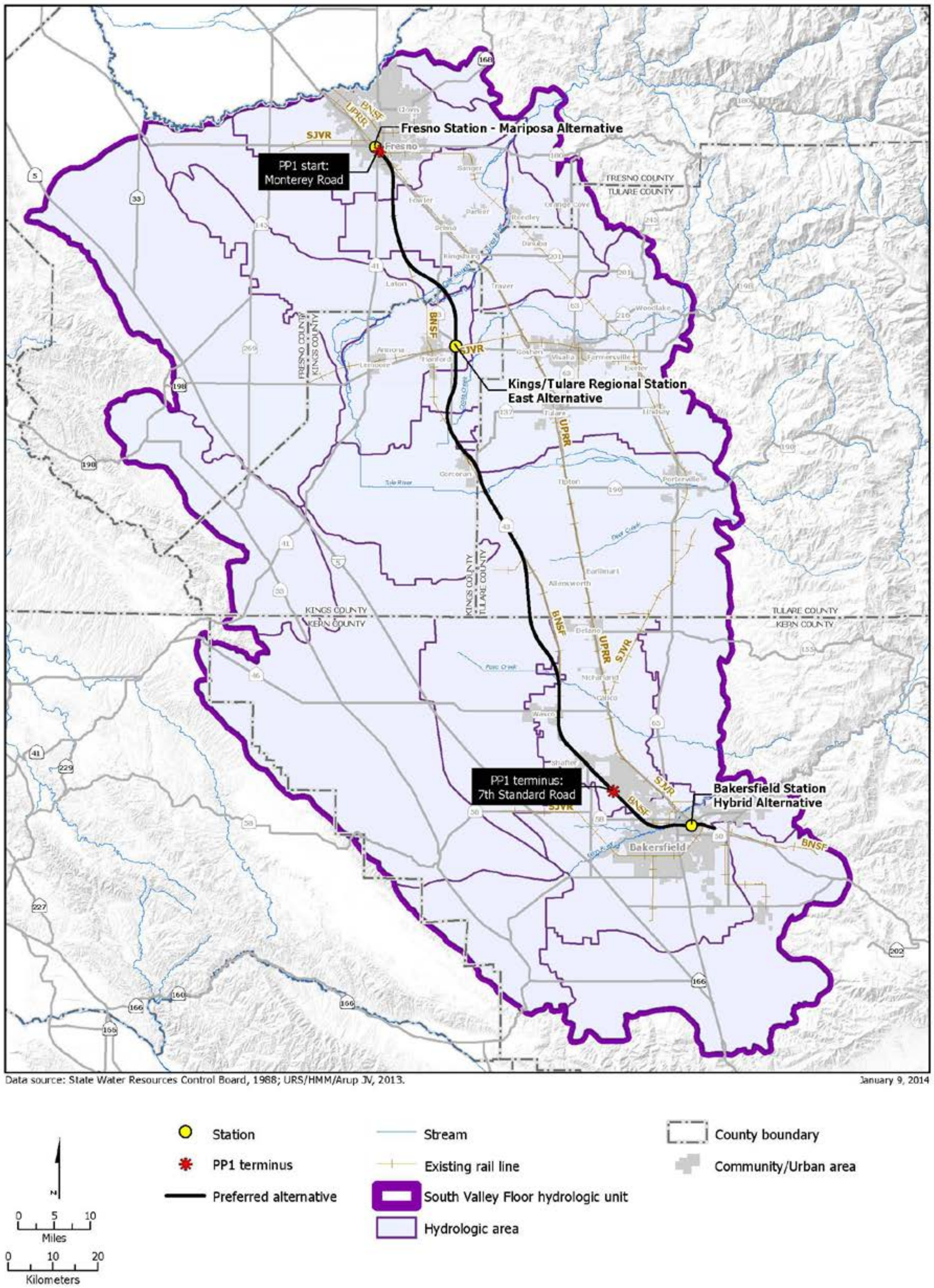


Figure A-1
Permitting Phase 1 of the Fresno to Bakersfield Section

Where feasible and practical, the stormwater design will do the following:

- Incorporate source control/design pollution prevention (DPP) BMPs to the extent feasible into the design of project elements.
- To the extent feasible, provide LID treatment BMPs to treat runoff from pollution-generating impervious surfaces and to mitigate hydromodification impacts before discharging to receiving waters. Where LID treatment BMPs are infeasible or inadequate, incorporate secondary treatment BMPs, to the extent feasible.
- Incorporate additional site design and source control BMPs where appropriate such as those identified in the Stormwater Best Management Practice Handbook, New Development and Redevelopment (California Stormwater Quality Association 2009, as it may be amended) to minimize the mobilization of pollutants.
- Incorporate robust operational BMPs to manage metals, pesticide, and fertilizer contributions in stormwater.
- Disperse onsite runoff to maximize retention to the extent feasible and appropriate onsite through local infiltration.

A1.1 Methodology and Standards for Selection of Treatment BMPs

The selection of DPP and treatment BMPs is targeted based on PP1's impacts on downstream receiving waterbodies. This section summarizes the existing receiving waters and identifies the pollutants of concern.

A1.1.1 Receiving Waters for Stormwater Discharges

The receiving waterbodies for stormwater discharges from the project, and the regulatory environment for PP1 were identified and discussed as part of the *Fresno to Bakersfield Section Hydrology Hydraulics and Drainage Report and Stormwater Quality Management Report* (Authority and FRA 2013a, 2013b) and the Fresno to Bakersfield Section EIR/EIS (Authority and FRA 2014). Table A-1 summarizes the major receiving waters in PP1. This list includes the downstream natural creeks and rivers with watersheds that are crossed by the HST project, but it does not include all water features directly or indirectly affected by the project.[3] For example, numerous irrigation canals and agricultural ditches are identified in the project's wetland delineation, EIR/EIS, and 404 permit application. These water features are either tributary or distributary to the natural streams and creeks listed here.

[3] A comprehensive list of all receiving water features, including riparian, seasonal riverine, seasonal wetland, emergent wetland, vernal pools and swales, lacustrine, and canals and ditches, is presented in the application for Section 401 Water Quality Certification.

Table A-1
Fresno to Bakersfield Section, Major Receiving Waterbodies for Stormwater Discharges

Waterbody
Kings River Complex (Cole Slough, Dutch John Cut, Old Kings River)
Cross Creek
Tule River
Deer Creek
Poso Creek

A1.1.2 Primary Pollutants of Concern and 303(d) List

Pollutant removal from runoff will be accomplished using treatment BMPs, which are measures designed to remove pollutants from stormwater runoff prior to discharging (directly or indirectly) to receiving waters. The selection of treatment BMPs for PP1 will be based on the Caltrans 2010 *Project Planning and Design Guide* (PPDG), modified to reflect prioritization of BMPs that infiltrate, capture and reuse, or evapotranspire the design volume or flow of runoff.

When a downstream receiving waterbody within the project limits is on the Clean Water Act Section 303(d) list of impaired waterbodies for one or more of the Section 303(d)-listed water quality parameters, treatment for these water quality parameters, also known as primary pollutants of concern, will be considered in accordance with Caltrans' Targeted Design Constituent (TDC) Approach or equivalent. As outlined in the PPDG, a TDC is a pollutant that has been identified during Caltrans runoff characterization studies to be discharging with a load or concentration that commonly exceeds allowable standards and which is considered treatable by currently available Caltrans-approved treatment BMPs. The TDCs identified in the PPDG include phosphorus, nitrogen, total and dissolved copper, total and dissolved zinc, total and dissolved lead, and sediments. TDCs also include a category known as general metals, which includes cadmium, nickel, chromium, and other trace metals. BMPs designed and implemented using the TDC approach also provide general purpose pollutant removal, controlling all pollutants of concern, including those not specifically identified as TDCs. Table A-2 lists the impaired waterbodies that are downstream of PP1. None of these waters has been identified as impaired due to a TDC.

Construction and operation of the HST facilities are not expected to generate material quantities of the impairing pollutants that have been identified for these receiving waters. With respect to the pollutants listed on the 303(d) list, the project will not contribute toxaphene—a pesticide that is currently banned in the United States and whose use has been severely restricted since the 1980s—nor will it contribute chlorpyrifos, a more recently developed pesticide. Existing molybdenum is likely from natural sources or fertilizers. Molybdenum is used as an alloy with steel to increase strength and heat resistance, and sometimes used in lubricants, so it may exist in the materials used to construct and operate the HST. However, molybdenum will not be in a form or quantity that will contribute to water quality degradation. Electrical conductivity is a surrogate for dissolved solids, and the HST will not contribute dissolved solids to receiving waters and therefore not contribute to conductivity in the Kings River.

Table A-2
Section 303(d) List of Impaired Waters in PP1

Waterbody	Pollutant Category	Pollutant	TMDL Completion Date
Kings River, Lower (Island Weir to Stinson and Empire Weirs)	Metals/Metalloids	Molybdenum	2015
	Salinity	Electrical Conductivity	2015
	Pesticides	Toxaphene	2015
King River, Lower (Pine Flat Reservoir to Island Weir)	Pesticides	Chlorpyrifos	2021
	Toxicity	Unknown Toxicity	2021
Cross Creek (Kings and Tulare Counties)	Toxicity	Unknown Toxicity	2021
Deer Creek (Tulare County)	pH	pH (high)	2021
	Toxicity	Unknown Toxicity	2021

Notes: The pesticides identified here will not be used for HST operations, pursuant to the terms of and conditions of the integrated fertilizer and pesticide management plans that must be prepared for HST facility operations and landscaped areas.

TMDL = total maximum daily load

Source: SWRCB 2010. http://www.waterboards.ca.gov/water_issues/programs/tmdl/integrated2010.shtml

The 401 certification application includes a complete list of the affected water features, including riparian, seasonal riverine, seasonal wetland, emergent wetland, vernal pools and swales, lacustrine, and canals and ditches. BMPs will be deployed at all HST facilities to protect the downstream receiving waterbodies and water features. Stormwater treatment for TDCs and any pollutant that may be impairing a waterbody and associated with the HST project is warranted for all Authority projects. Further, turbidity and total suspended solids are two parameters that should be treated in stormwater runoff generally. Friction processes associated with train braking and wheel/rail interactions may be expected to result in diffuse emissions of various metals, including iron, copper, manganese, and chromium; therefore, per the PPDG, treatment for these types of metals should also be provided in relevant locations (Burkhardt et al. 2008).

A1.1.3 Beneficial Uses

Beneficial uses for waterbodies within PP1 are identified in the *Water Quality Control Plan for the Tulare Lake Basin* (Basin Plan) (CVRWQCB 2004). The Basin Plan includes various beneficial uses, including “municipal and domestic” (MUN), which is defined as uses of water for community, military, or individual water supply systems, including but not limited to drinking water supply.

While the Basin Plan identifies specific beneficial uses for many waterbodies within PP1, it is impractical to identify every surface waterbody in the region. Table A-3 summarizes the beneficial uses for downstream creeks and rivers with watersheds that are crossed by the HST PP1 project.

Table A-3
Beneficial Uses for Waterbodies within PP1

Waterbody	Beneficial Uses
Kings River (Peoples Weir to Stinson Weir on North Fork and to Empire Weir No. 2 on South Fork)	Agricultural Supply; Water Contact Recreation; Non-Contact Water Recreation; Warm Freshwater Habitat; Wildlife Habitat; Groundwater Recharge
Cross Creek (Kaweah River, Below Lake Kaweah)	Municipal and Domestic Water Supply; Agricultural Supply; Industrial Service Supply; Industrial Process Supply; Water Contact Recreation; Non-Contact Water Recreation; Warm Freshwater Habitat; Wildlife Habitat; Groundwater Recharge
Tule River (below Lake Success)	Municipal and Domestic Water Supply; Agricultural Supply; Industrial Service Supply; Industrial Process Supply; Water Contact Recreation; Non-Contact Water Recreation; Warm Freshwater Habitat; Wildlife Habitat; Groundwater Recharge
Poso Creek	Agricultural Supply; Water Contact Recreation; Non-Contact Water Recreation; Warm Freshwater Habitat; Cold Freshwater Habitat; Wildlife Habitat; Groundwater Recharge; Freshwater Replenishment

Note: Beneficial use listed is “Existing” unless noted as “Potential.”
Source: CVRWQCB 2004

A1.2 Design Pollution Prevention Best Management Practices

The following source control/design pollution prevention (DPP) BMPs will be incorporated into the PP1 Project, where feasible, to achieve incidental runoff reduction:

- Conserve natural areas, to the extent feasible, including existing trees, stream buffer areas, vegetation and soils.
- Minimize the impervious footprint of the project.
- Minimize disturbances to natural drainages.
- Design and construct pervious areas to effectively receive runoff from impervious areas, taking into consideration the previous areas’ soil conditions, slope and other pertinent factors.
- Implement landscape and soil-based BMPs such as compost-amended soils and vegetated strips and swales (e.g., biofiltration strips and swales).
- Use climate-appropriate landscaping that minimizes irrigation and runoff, promotes surface infiltration, and minimizes the use of pesticides and fertilizers.
- Design all landscapes to comply with the California Department of Water Resources Water Efficient Landscape Ordinance (California Department of Water Resources 2013). Where the California Department of Water Resources Water Efficient Landscape Ordinance conflicts with a local water conservation ordinance, the Department will comply with the local ordinance.

The project will implement site design BMPs and source control BMPs at HST facilities. The *California Stormwater BMP Handbook* can act as additional guidance for these strategies (see summary of BMPs in Tables A-4 and A-5). Site design and source control BMPs are intended to reduce post-project runoff, control sources of pollutants, and retain onsite runoff through infiltration, evapotranspiration, or reuse.

Table A-4
Site Design BMPs

Number	BMP and Objective
SD 1.1	**Maximize permeable area:** Generally, permeable areas are integrated into the design to the maximum extent practicable.
SD 1.2	**Conservation of natural areas:** Natural areas such as wetlands or upland habitats are preserved, where feasible.
SD 1.3	**Use of permeable paving or other surfaces**: Paving within parking areas or pedestrian walkways are constructed of pervious material including but not limited to pervious asphalt, paving stones, or crushed aggregates
SD 1.4	**Designing to minimum widths necessary:** Streets, sidewalks, and parking lot aisles are designed to the minimum widths necessary, while complying with Americans with Disabilities Act (ADA) regulations and other life safety requirements.
SD 1.5	**Incorporation of landscaped buffers:** Landscape buffers are used between large impervious areas such as roadways, parking lots, and pedestrian walkways to improve safety and aesthetic characteristics, and provide opportunities for stormwater management.
SD 1.6	**Reduced street widths:** Keep any roadway widths to minimums required to accommodate the desired use. Applicable to any maintenance access roadways.
SD 1.7	**Maximize canopy interception:** Plant species with multiple canopy levels to maximize interception of rainfall. Use trees in combination with shrubs and groundcover.
SD 1.8	**Use of native or drought tolerant trees/shrubs:** Native vegetation and drought tolerant vegetation is used to reduce irrigation and associated runoff.
SD 1.9	**Minimizing impervious surfaces in landscaping:** Impervious walkways and plaza areas are set to minimum widths and lengths, as practicable to comply with ADA standards.
SD 1.10 and SD 2.3 (essentially same practice)	**Use of natural drainage systems and vegetated swales:** Use of at-grade drainage systems such as vegetated drainage swales or naturalized channels to convey runoff. These systems typically require more space but are less costly to implement and maintain than gravity storm drain systems. At-grade drainages are surfaced with pervious material to promote infiltration. While at-grade drainages sometimes provide water quality treatment, the majority of at grade drainages will terminate at treatment BMPs.
SD 2.1	**Draining rooftops into adjacent landscaping:** Runoff from rooftops including stations and any parking structures would drain to landscaped areas rather than directly to storm drains. Landscaped areas would be designed to receive runoff without causing erosion or structural damage.
SD 2.2	**Draining to adjacent landscaping:** All impervious areas within and around stations would drain, where practicable, to landscaped areas. Landscaped areas would be designed to receive runoff without causing erosion or structural damage.

Table A-4
Site Design BMPs

Number	BMP and Objective
SD 2.3	**Vegetated drainage swales:** Vegetated drainage swales would be implemented in lieu of subsurface drainage pipes to the maximum extent practicable. The drainage swales in most cases would discharge into treatment BMPs.
SD 2.4	**Site drainage system:** The site drainage design incorporates several methods for conveying street and parking area runoff to BMPs.
Source: CASQA 2004	

Table A-5
Structural Source Control BMPs

Number[a]	BMP and Objective
SC-10	**Site Design and Landscape Planning:** Landscape planning methodologies are incorporated into project design to maximize water storage and infiltration opportunities and minimize surface and groundwater contamination from stormwater.
SC-11	**Roof Runoff Controls:** Direct roof runoff away from paved areas and to pervious areas, cisterns, infiltration trenches, and/or storage areas for reuse to reduce total volume and rate natural infiltration rates at the site.
SC-12	**Efficient Irrigation:** Project plans include application methods to minimize irrigation water discharged into stormwater drainage systems.
SC-13	**Storm Drain System Signs:** Stencils or affixed signs are placed adjacent to storm drain inlets to prevent waste dumping.
SC-20	**Pervious Pavements:** Porous concrete or asphalt, blocks with pervious spaces or joints, or grass or gravel surfaces are employed to reduce runoff volume and provides treatment.
SC-21	**Alternative Building Materials:** Specialized building materials are employed that have lower potential to leach pollutants, and reduce need for future painting or other pollutant generating maintenance activities. For example, some treated wood contains pollutants that can leach out to the environment and some metal roofs and roofing materials result in high metal content in runoff.
SC-30	**Fueling Areas:** Project plans are developed for cleaning, spill cleanup, containment, leak prevention, and incorporation of design to reduce rain and runoff that could come in contact with fueling areas.
SC-31	**Maintenance Bays and Docks:** Project design incorporates measures to cover or otherwise eliminate run-on and runoff from bays and docks, and direct connections to storm drain are eliminated.
SC-32	**Trash Enclosures:** Trash storage areas are covered and enclosed to prevent introduction of trash and debris to site runoff.
SC-33	**Vehicle and Equipment Washing Areas:** Designated wash areas or facilities are contained and wash water is reused, treated, or otherwise properly disposed of.

Table A-5
Structural Source Control BMPs

Number[a]	BMP and Objective
SC-34	**Outdoor Material Storage Areas:** Outdoor storage areas for materials containing pollutants, especially hazardous materials, are covered and enclosed, on impervious surfaces, and include secondary containment when applicable.
SC-35	**Outdoor Work Areas:** Outdoor work areas are covered, contained, and treated as necessary to reduce opportunity of pollutants from work activities to enter stormwater.
SC-36	**Outdoor Processing Areas:** Outdoor processing areas are covered, contained, and treated as necessary to reduce opportunity of pollutants from work activities to enter stormwater.

[a] Numbers correspond to the CASQA's Stormwater BMP Handbook for New Development and Redevelopment
Source: CASQA 2004

The following DPP BMPs may also provide treatment and hydromodification benefits for development of the power substation or HST station facilities. The D/B Contractor will evaluate the feasibility of implementing these BMPs and document this analysis in the WQMP.

A1.2.1 Biofiltration Swales and Strips

Biofiltration swales (bioswales) and biofiltration strips (biostrips) should be maximized and designed wherever feasible to provide stormwater conveyance in lieu of lined channels. They can also provide functional treatment of runoff and meet incidental volume reduction objectives by infiltrating all or a portion of the design capture volume.

Bioswales and biostrips are designed to remove pollutants by straining runoff through the grass or other vegetation in the channel. Bioswales are open, shallow, vegetated channels that receive directed flow and slowly convey stormwater to downstream discharge points. Biostrips are vegetated sections of land over which stormwater flows as overland sheet flow. They are effective at trapping litter, total suspended solids (soil particles), and particulate metals by slowing flow to allow for sedimentation, filtering through a subsoil matrix, adsorption to soil particles, and infiltration into the soil. Swales can be natural or manmade. Flow attenuation is also provided by virtue of evaporation and transpiration of runoff into the vegetated soil. Thus, biofiltration swales and strips can also be considered a LID technique (Caltrans 2010).

These BMPs are most applicable in areas where site conditions and climate allow for the establishment of vegetation, where flow velocities are low, and where the length of flow through the bioswales or across the biostrips can be maximized. They should be considered at locations along the alignments where longitudinal slopes are 3 percent or less and where right-of-way requirements will not conflict with other environmental mitigation. For successful treatment, a bioswale must achieve a minimum hydraulic residence time of 5 minutes. A key consideration in the design of bioswales is to have peak design-flow velocities less than 4 feet per second through the swale to avoid erosion. Much of the HST alignment is at longitudinal grades less than 1 percent because of the relatively flat local topography and the need for gradual changes in the vertical track profile. Such grades generally allow design flows to remain non-erosive.

In accordance with the Caltrans Treatment BMP Technology Report (Caltrans 2007), bioswales have good removal efficiencies for metals and total suspended solids. Compost-amended biofiltration swales and strips should be proposed when soil amendments can increase infiltration to meet incidental volume reduction goals (see Evapotranspiration BMPs below).

A1.2.2 Impervious Area Disconnections and Downspout Disconnections Using Bioretention Facilities

Impervious area disconnection and downspout disconnection relies on bioretention facilities to provide temporary storage. These facilities are vegetated shallow depressions that capture and filter stormwater runoff. Biological and chemical reactions in the soil and root zone remove pollutants, and runoff volume is reduced through plant uptake and infiltration into the underlying soil. Bioretention facilities may be designed with underdrains for areas with low permeability. Bioretention facilities, therefore, inherently achieve the maximum feasible level of infiltration and evapotranspiration and achieve the minimum feasible (but highly treated) discharge.

These facilities work best when they are designed in a relatively level area. Bioretention facilities can be used in smaller landscaped spaces on the site, such as at parking islands and site entrances. Landscaped areas on the site can often be designed as bioretention facilities. This can be accomplished by depressing landscaped areas below adjacent impervious surfaces rather than elevating those areas, and by grading the site to direct runoff from those impervious surfaces into the bioretention facility rather than away from the landscaping.

The D/B Contractor will document the value of the incidental runoff reductions achieved with impervious area disconnections and downspout disconnections by using the CGP Post-Construction Water Balance Performance Standard Spreadsheet (see CGP Appendix 2, SWRCB 2009).

A1.2.3 Permeable Pavement

Permeable pavements can be either pervious asphalt and concrete surfaces, or permeable modular block. Unlike traditional, impermeable pavements, permeable pavements reduce the volume and peak of stormwater runoff and mitigate pollutants from stormwater runoff, provided that the underlying soils can accept infiltration. The permeable surface is underlain by a storage reservoir consisting of a uniformly graded aggregate bed or pre-manufactured structural stormwater units. An optional filter layer with sub-drains may be incorporated for installation on soils that do not support infiltration.

The D/B Contractor will document the value of the incidental runoff reductions achieved with permeable pavement by using the CGP Post-Construction Water Balance Performance Standard Spreadsheet (see CGP Appendix 2, SWRCB [2009]).

A1.3 Stormwater Treatment Control Strategy

To comply with the post-construction stormwater quality standards for PP1, the D/B Contractor will implement DPP BMPs where feasible to achieve incidental runoff reduction. If the entire 85th percentile runoff event can be infiltrated, harvested, and reused or evapotranspired using DPP BMPs, no further treatment BMPs are required. The D/B Contractor will document the value of the infiltration achieved using DPP BMPs such as biofiltration swales and strips using the Caltrans Infiltration Tool (T-1) (Caltrans 2013) or equivalent.

For runoff that cannot be reduced and infiltrated using DPP BMPs, treatment control BMPs for Authority facilities and for non-Authority projects will[4] be selected and designed according to the following priorities (in order of preference):

1. Infiltrate, harvest and re-use, and/or evapotranspire the stormwater runoff using LID BMPs.

2. Capture and treat the stormwater runoff using LID-based flow through devices (secondary BMPs).

3. Capture and treat the stormwater runoff using conventional volume-based and flow-based stormwater treatment devices (other BMPs).

Sizing criteria for treatment BMPs will be in accordance with the 2010 Caltrans PPDG (as it may be updated) or equivalent. Generally, stormwater runoff volumes and rates used to size BMPs will be based on the 85th percentile 24-hour storm event. In the event the entire runoff volume from an 85th percentile 24-hour storm event cannot be infiltrated, harvested and re-used, or evapotranspired, the excess volume may be treated by LID-based flow-through treatment devices. These BMPs increase soil storage of runoff and improve infiltration and evapotranspiration. Feasibility criteria for LID BMPs are provided below.

Where LID-based flow-through treatment devices are not feasible based on physical constraints of the project site, the excess volume may be treated through conventional volume-based or flow-based stormwater treatment devices, such as media filters, wet basins, and other BMPs. Design criteria are provided below and additional criteria can be found in the 2010 Caltrans PPDG. The Contractor will document the feasibility determination for each BMP in the WQMP.

A1.4 LID Treatment BMPs

The list of available BMPs that would be implemented for rail facilities is based on those recommended in the PPDG (Caltrans 2010, as it may be amended) and includes infiltration, harvest and re-use, and evapotranspiration BMPs. These BMPs have been shown to effectively reduce pollutants typical of transportation infrastructure. While the Authority facilities may be analogous to roadway facilities, there are distinct differences in volume of traffic, the types of fuels used, the presence and duration of hazardous substances, and other pollutant sources. The pollutant loading and characterization of runoff from Authority facilities are likely to be different from freeway/highway facilities; nevertheless, the BMPs used by Caltrans are anticipated to effectively target similar pollutants expected to run off from Authority facilities, such as suspended solids, metals, oils, and grease.

The Caltrans-approved treatment BMPs prioritized by this WQTR include the following, in order of priority, infiltration devices, biofiltration swales, biofiltration strips, detention devices, media filters, multichambered treatment trains (MCTT), traction sand traps, wet basins, dry weather diversions, and gross solids removal devices (GSRDs). With the exception of GSRDs, all of these BMPs are considered effective in removing turbidity, total suspended solids, and particulate metals (Caltrans 2010). With the exceptions of gross solids removal and detention devices, these BMPs are also considered effective in removing dissolved metals. Note that traction sand traps

[4] Authority facilities are defined as the linear features of PP1, including rail line, at-grade embankment, and elevated structures. Non-rail facilities include associated facilities such as stations, maintenance-of-way facilities, electrical facilities, maintenance facilities, roadway modifications, and traction power substations. “Non-Authority” projects comprise improvements to existing facilities or new developments that will be owned by other agencies after construction (e.g., frontage road improvements).

are not considered appropriate because of the study area's relatively warm winter weather and the rarity with which traction sand is ever applied in the region.

Additionally, other LID site design BMPs, such as harvest and re-use, bioretention, and permeable pavement, provide volume reduction sufficient to effectively provide not only treatment but also hydromodification benefits for HST facilities. Other BMPs may also be considered, if found to be needed and appropriate (see County of Los Angeles 2009 and Low Impact Design Center Inc. 2010).

A1.4.1 Priority Treatment BMPs

Infiltration devices, harvest and re-use, and evapotranspiration devices such as bioretention facilities, compost-amended biofiltration swales and strips will be chosen first to meet post-construction stormwater treatment and hydromodification standards. These BMPs are described in the sections below. The Contractor will evaluate the feasibility of implementing these BMPs and document this analysis in the WQMP.

A1.4.1.1 Infiltration Devices

Infiltration devices include basins, trenches, and dry wells. These devices may also work very effectively in conjunction with biofiltration or compost-amended biofiltration BMPs to minimize runoff from a project site. They are designed to remove pollutants from surface discharges by retaining stormwater runoff and infiltrating it directly into the soil without release to surface waters.

Infiltration basins temporarily store runoff in excavated areas for later infiltration over an extended period. An infiltration trench uses relatively shallow excavations backfilled with gravel or other high-porosity materials to create subsurface storage for runoff that will infiltrate into the surrounding soils over a specified design period. Trenches are often elongated, allowing them to be used in constricted areas, but there is no shape restriction.

During a storm, and for some time afterward, the runoff stored in these devices infiltrates into the soil through the soil interfaces. Sizing criteria are provided in the 2010 Caltrans PPDG (as it may be amended) and include the design volume or runoff to be treated, the permeability of the soil below the invert, and the time period selected for infiltration. Flows exceeding the design capture volume must discharge to a downstream conveyance system.

The use of infiltration devices may be restricted by concerns over groundwater contamination, soil permeability, and clogging at the site. Where this BMP is used, the soil beneath the basin must be thoroughly evaluated and documented in a geotechnical report because the underlying soils are critical to the BMP's long-term performance. Stormwater infiltration may be considered infeasible if any of the following conditions apply:

- Where infiltration devices may not fit within the available HST right-of-way, and where no additional right-of-way may be acquired to implement infiltration devices.
- The infiltration facility is located within 15 feet of a structure or structural foundation.
- Seasonally high groundwater or mounded groundwater is less than 5 feet below the designed bottom of the infiltration facility.
- Seasonally high groundwater or mounded groundwater is less than 10 feet below the designed bottom of the infiltration facility and significant treatment is not provided in the BMP before groundwater injection.

- The infiltration facility is less than 100 feet horizontally from a water supply well, nonpotable well, drain field, or spring.
- The BMP tributary area contains high risk land use activities which would result in significant risks to drinking water quality and groundwater quality that cannot be reasonably and technically mitigated through methods such as isolation of sources and/or pre-treatment of runoff to address pollutants of concern prior to infiltration.
- For brownfield sites or adjacent sites, where stormwater infiltration would result in a significant risk of mobilizing or moving contamination that cannot be reasonably and technically avoided, as documented by a site-specific or available watershed study. The documenting study will have sufficient resolution to positively identify areas of the property where unremediated contamination is located and where stormwater infiltration should be restricted to prevent pollutant mobilization.
- Where a groundwater pollutant plume (man-made or natural) is under the site or in close proximity and there is substantial evidence that stormwater infiltration would cause or contributing to plume movement that cannot be reasonably and technically avoided, as documented by a site-specific study or available watershed study. The documenting study will have sufficient resolution to positively identify areas where stormwater infiltration should be restricted.
- The location is less than 50 feet away from slopes steeper than 15 percent.
- The location is less than 8 feet from building foundations or an alternative setback established by the geotechnical expert for the project.
- A study prepared by a geotechnical professional or an available watershed study determines that stormwater infiltration would result in significantly increased risks of geotechnical hazards on or adjacent to the project site that cannot be reasonably and technically mitigated. The documenting study will have sufficient resolution to positively identify locations on a project site where stormwater infiltration should be restricted.
- Where infiltration of runoff from the project would violate downstream water rights. While it is not anticipated that infiltration of runoff would violate water rights, water law in California is complex, and this WQTR does not exclude the possibility that a rightful water rights claim could restrict infiltration of stormwater.

If there is substantial evidence that an increase in infiltration over pre-developed conditions would cause impairments to downstream beneficial uses, such as change of seasonality of ephemeral washes or increased discharge of contaminated groundwater to surface waters, the level of allowable increase in infiltration must be documented in a site-specific study or watershed plan, and it must be demonstrated that standalone infiltration BMPs would exceed the allowable level of increase in infiltration or what level could be infiltrated as a partial consideration.

When considering infiltration for feasibility, the site soil characteristics must be considered. Soils are assigned a hydrologic soil group (HSG) rating, A through D, which describes the physical drainage and textural properties of each soil type and is useful for stormwater, wastewater, and other applications. This HSG rating is usually based on a range of permeability, as well as certain physical constraints such as soil texture, depth to bedrock, and seasonal high water table. Soil types assigned an HSG A classification are very well drained and highly permeable (sand, loamy sand, sandy loam); HSG D soils (clay loam, silty clay loam, sandy clay, silty clay, clay) are poorly drained. HSG B and C soils offer good (B: silt loam, loam) to fair (C: sandy clay loam) drainage characteristics (Caltrans 2009). The heavier HSG D soils have little if any infiltration potential

during rainfall events and produce much greater surface runoff in response to rainfall. Soils along the HST alignment are variable but generally provide very good to fair drainage characteristics.

A1.4.1.2 Harvest and Re-use BMPs

Harvest and re-use BMPs include both above-ground and underground cisterns and/or vaults. Such BMPs collect and temporarily store runoff for later nonpotable uses, including irrigation. Above-ground cisterns collect and temporarily store runoff from rooftops or other above-ground impervious surfaces. Underground cisterns include subsurface tanks, vaults, and oversized pipes that temporarily store runoff for later use. These systems can include pipes that divert runoff to the cistern, an overflow system for when the cistern is full, a pump, and a distribution system to supply the intended uses.

These BMPs are most suitable for areas of vertical construction (such as the HST stations and covered maintenance facilities) where no vector control issues are anticipated. Harvest and re-use will be considered for implementation except where the following conditions apply:

- If inadequate demand exists for the use of the harvested rainwater.
- If adequate space is not reasonably attainable.
- If the use of harvested water for the type of demand on the project violates codes or ordinances most applicable to stormwater harvesting in effect at the time of project application.
- If harvest and use of runoff would violate downstream water rights. While it is not anticipated that harvest and use of runoff would violate water rights, water law in California is complex, and this WQTR does not exclude the possibility that a rightful water rights claim could restrict harvest and use of stormwater. Water rights could potentially be violated by reduction in infiltrated volume or reduction of surface runoff. If harvest and use BMPs are used, they will comply with applicable wastewater discharge regulations where applicable.
- If harvest and use systems pose a significant risk to human health. Considerations relative to harvest and use systems and public health are anticipated to be project-specific, and specific guidance is not provided in the WQTR at this time.

A1.4.1.3 Evapotranspiration BMPs

Evapotranspiration BMPs include planted areas that capture runoff, allow infiltration into the soil and encourage uptake by planted vegetation. Some DPP BMPs, such as compost-amended biofiltration swales and biofiltration strips (bioswales and biostrips), may be used to special advantage as evapotranspiration BMPs because they also provide conveyance for runoff. Compost-amended biofiltration swales and strips would be proposed when soil amendments can increase infiltration. Numerous studies have demonstrated that under various conditions, compost increases infiltration and reduces runoff quantities due to its water-absorbing capacity and ability to increase soil hydraulic conductivity (Caltrans 2010).

Biofiltration swales and strips (compost-amended as appropriate) should be maximized and designed to infiltrate the entire design capture volume where feasible. Where highly infiltrating soils exist such that the soil infiltrates the entire design capture volume, then it should be proposed as the first treatment option. For areas with poorly draining soils, to enhance infiltration and eliminate stratification, many specifications call for the incorporation of compost into the underlying soil to a depth of at least 8 to 12 inches on flat or relatively flat sites. This application not only improves water-holding and infiltration capacity but also provides a deeper rooting zone for newly seeded vegetation. The benefits of enhanced vegetation, stronger slopes, improved soil

structure, and improved infiltration and storage capacity work together as a system to enhance water quality downstream of a project site.

A1.4.2 Secondary Treatment BMPs

In the event the entire runoff volume from an 85th percentile 24-hour storm event cannot be infiltrated, harvested, and re-used, or evapotranspired, the excess volume may be treated by LID-based flow through treatment devices. The following BMPs, including LID-based flow-through devices, and project area, regional, and subregional flow control BMPs such as extended detention basins, and unamended biofiltration swales and strips, will be considered where primary BMPs (infiltration devices, harvest and re-use, and evapotranspiration devices) are deemed not feasible. The Contractor will evaluate the feasibility of implementing these BMPs and document this analysis in the WQMP.

A1.4.2.1 Extended Detention Basins

An extended detention basin is a permanent device that temporarily detains stormwater runoff under calm, non-turbulent conditions, such that sediment and particulates are able to settle before the runoff is discharged. A small portion of the detained water is also lost due to infiltration (if the basin is unlined) and evaporation. Compost amendments may be used in extended detention basins to enhance infiltration. Compost amendments, if needed, would be designed based on Caltrans' Infiltration Estimating Tool (Caltrans 2013) or equivalent. Using compost amendments may help reduce the required overall extended detention basin size.

Detention basins remove litter, settleable solids (debris), total suspended solids, and pollutants that are attached (adsorbed) to the settled particulate matter. Detention basins are primarily suited for sites where the seasonal high groundwater is below the bottom of the basin and where an elevation difference is available so that water stored in the basin does not cause objectionable backwater conditions in the storm drain systems. Detention basins should be designed to drain within 72 hours so as not to promote vector problems. In accordance with the Caltrans Treatment BMP Technology Report (Caltrans 2007), detention basins have good removal efficiencies for total metals (mainly those in particulate form) and suspended solids, which are pollutants of concern.

A1.4.2.2 Unamended Biofiltration Swales and Strips

Unamended biofiltration swales (bioswales) are similar in design and applicability to soil-amended biofiltration devices. These BMPs are most applicable in areas where site conditions and climate allow for the establishment of vegetation, where infiltration capacity of existing soils is low even with soil amendments, where flow velocities are low, and where the length of flow through the bioswales or across the biostrips can be maximized. Even unamended biofiltration swales have good removal efficiencies for metals and total suspended solids (Caltrans 2007).

Bioswales should be considered at locations along the alignments where longitudinal slopes are 3 percent or less and where right-of-way requirements will not conflict with other environmental mitigation. For successful treatment, a bioswale must achieve a minimum hydraulic residence time of 5 minutes. A key consideration in the design of bioswales is to have peak design-flow velocities less than 4 feet per second through the swale to avoid erosion.

Much of the HST alignment is at longitudinal grades less than 1 percent because of the relatively flat local topography and the need for gradual changes in the vertical track profile. Such grades generally allow design flows to remain below 4 feet per second.

A1.4.3 Conventional Treatment BMPs

Where LID-based flow-through treatment devices are not feasible, the excess volume may be treated through conventional volume-based or flow-based BMPs. The following conventional treatment BMPs—media filters and wet basins—would be considered where primary and secondary BMPs are deemed infeasible. The Contractor will evaluate the feasibility of implementing these BMPs and document this analysis in the WQMP.

A1.4.3.1 Media Filters

Media filters primarily remove particulates from runoff by sedimentation and filtration, and they effectively remove dissolved metals and litter. Media filters require 3 feet of hydraulic head to operate by gravity. There are a number of design variations, including the Austin sand filter, Delaware sand filter, and MCTT:

- Austin sand filters typically have an open top, are designed at-grade, and have no permanent water pool. An Austin sand filter may be configured with earthen or concrete sides. Austin style media filters are technically feasible for PP1.
- Delaware sand filters are configured with closed concrete chambers to allow the surface above the filter to be hardened for project use. The filter media is below grade and has a permanent pool of water, which is a concern for vector control. Delaware style media filters are suitable for relatively small drainage areas where surface use over the filter is required, such as may be the case at the HST station. However, Delaware sand filters have a relatively high cost compared to Austin sand filters and MCTT.
- The MCTT is a stormwater treatment device that uses different treatment mechanisms in each of three separate chambers. The MCTT was developed for treatment of stormwater at critical source areas, such as service facilities, parking areas, paved storage areas, and fueling locations. MCTT siting guidelines indicate that they should be considered if the pollutant concentrations are significantly above those found in the runoff from the state highway system (Caltrans 2010). MCTTs may be appropriate for portions of the HST station.

A1.4.3.2 Wet Basins

A wet basin is a detention system that comprises a permanent pool of water, a temporary storage volume above the permanent pool, and a shoreline zone planted with aquatic vegetation. Wet basins are designed to remove pollutants from surface discharges by temporarily capturing and detaining the design volume in order to allow settling and biological uptake to occur. Wet basin design requires a permanent source of water for the pool. It is unlikely that a permanent source of water will be available for a new wet basin facility, and a permanent pool could also cause concerns with vector control. Therefore, a wet basin is an unlikely BMP choice for PP1.

A1.5 Implementation of LID Treatment BMPs

The Authority should always prioritize the use of landscape and soil-based BMPs—that is, Priority Treatment BMPs—to emphasize onsite infiltration and/or biofiltration to treat runoff for all HST facilities in PP1. Secondary and other BMPs may be used only after primary treatment BMPs are determined to be infeasible. The infeasibility of implementing LID BMPs will be determined through site-specific analyses. Specific infeasibility criteria are provided above. The Contractor will evaluate the feasibility of implementing these BMPs and document this analysis in the WQMP.

Where infiltration-based BMPs are proposed, appropriate infiltration and percolation tests must be performed to verify soil and subsoil infiltration and percolation rates. Infiltration tests should

be performed as close as possible to the sites where infiltration-based BMPs are proposed. Typically, a minimum infiltration rate of 0.5 inch per hour is required for a site to be feasible.

For areas of PP1 within the Fresno Metropolitan Flood Control District's (FMFCD's) Master Plan boundaries, compliance with the Fresno Municipal Separate Storm Sewer System (MS4) permit will be acceptable to meet post-construction standards. In locations where direct connections to FMFCD facilities are feasible, LID measures are not required if runoff is discharged directly to FMFCD storm drains and infiltration basins. Where direct connections to FMFCD facilities will be used to meet post-construction standards, the Contractor will document this in the WQMP.

For all other areas, BMP selection will be based on constraints to be evaluated by the (D/B) contractor, including the following:

- Land use (for example, BMPs for culturally and biologically sensitive sites will be managed to reduce impacts).
- Storm drain conveyance viability (for example, the feasibility of draining by gravity to existing local stormwater infrastructure will need to be evaluated).
- Right-of-way and topographic constraints (for example, certain BMPs will be preferred due to space limitations or accommodated through onsite grading).
- Outlet locations (for example, releasing directly to major streams will reduce potential erosion on hillsides).

The D/B contractor will document the implementation of all LID treatment BMPs in the WQMP. The final WQMP will be submitted to the SWRCB if alternative compliance is required due to the infeasibility of implementing BMPs to achieve water quality and hydromodification standards.

A1.5.1 At-Grade Track

At-grade track will be constructed on ballast fill atop a constructed embankment, typically about 4 to 10 feet high (Figure A-2). In most locations, the new track will be constructed in areas of existing agricultural land uses, such as crop fields, fallow areas, access roads, irrigation ditches, and canals. Rail on ballast is not equivalent to impervious surfaces, the semi-permeable subgrade allows some infiltration and the ballast/sub-ballast structural section allows limited detention (Regional Transportation District 2011). Most new rail on ballast will be located in previously agricultural land uses; therefore, it is likely to result in some hydromodification impacts. Rainfall will percolate through the rail ballast but will be unlikely to infiltrate readily into the underlying ground due to compaction requirements beneath the rail ballast section. The runoff from at-grade track will sheet flow laterally out from the ballast to be collected in trackside ditches, where the stormwater would have the opportunity to infiltrate.

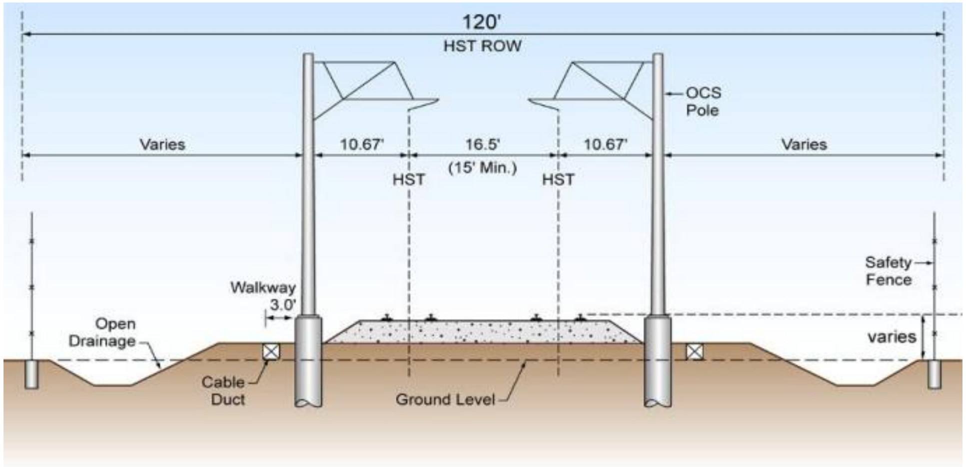


Figure A-2
At-grade typical cross section

The treatment strategy for at-grade track sections will be to maximize onsite retention of runoff using infiltration basins and biofiltration swales. Infiltration basins will be provided where they meet design feasibility criteria and where they may be constructed within the right-of-way. Where they cannot, biofiltration swales (with compost amendments as needed) will be designed to intercept all runoff from trackside ditches prior to discharging to new or existing drainage systems.

If the soils in the adjacent right-of-way are HSG A or B soils, the runoff will likely infiltrate onsite. For slower-infiltrating soils (HSG C and D), compost-amended soils in the right-of-way will encourage infiltration and reduce or eliminate runoff. Existing grades are generally less than 3 percent within PP1; therefore, design flow velocities are anticipated not to be erosive.

Within the Fresno MS4 permit area this treatment strategy may be simplified because direct discharges to the FMFCD regional drainage system would provide both treatment and hydromodification control for runoff from HST facilities.

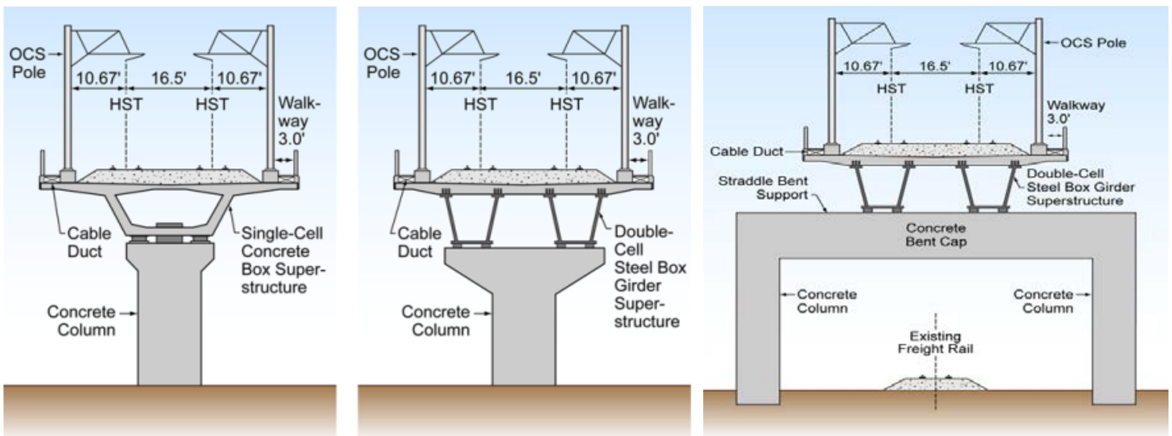
A1.5.2 Elevated Track Segments

Elevated track will be supported by slabs, beams, and columns constructed from reinforced concrete and steel that comprise the HST guideway (Figure A-3). Additionally, sections of retained fill will be required to construct the approaches to these elevated guideways (Figure A-4). Generally these sections of track will be required near stream crossings and in urbanized areas to accommodate existing development and to avoid at-grade street crossings. Outside of the urbanized areas, the elevated track will comprise new impervious area within the HST right of way. The new structures will be approximately 50 feet wide. Additional compacted ground will be required along the HST fence lines to provide maintenance access. Together, these are anticipated to result in hydromodification impacts for areas within the HST corridor. Within urbanized areas, this impact is not anticipated to be substantial due to the existing development.

The treatment strategy for elevated guideways will be to incorporate onsite retention and infiltration wherever feasible using biofiltration and infiltration devices. In other locations, such as above unpaved ground, runoff from the impervious track supports could be dispersed to native ground beneath the track for infiltration; this could be accomplished through several methods. Runoff could be allowed to sheet flow directly off the edges of the elevated guideway and disperse onto the ground. The use of this method would be more appropriate in less densely populated or rural areas where existing storm drainage infrastructure is uncommon. As an

alternative, raised curbs at the outer edges of the guideway could be used to collect runoff, which would be conveyed to the ground at each column for dispersal or retention and infiltration. Either of these approaches would largely eliminate the need for offsite ditches or pipes to convey local runoff, encouraging local retention instead.

Where the elevated guideway passes over developed urban corridors with existing impervious surfaces, rainwater will be collected via inlets and conveyed down support columns to the existing storm drainage system. An analysis of the receiving drainage system must be carried out to ascertain if there is adequate capacity. Where capacity to accommodate project runoff is insufficient, additional capacity will be added. Alternatively, onsite retention/detention could be pursued if adequate right-of-way exists.



(a) Concrete Superstructure (b) Steel Superstructure (c) Straddle bent

Figure A-3
Elevated structure typical cross sections

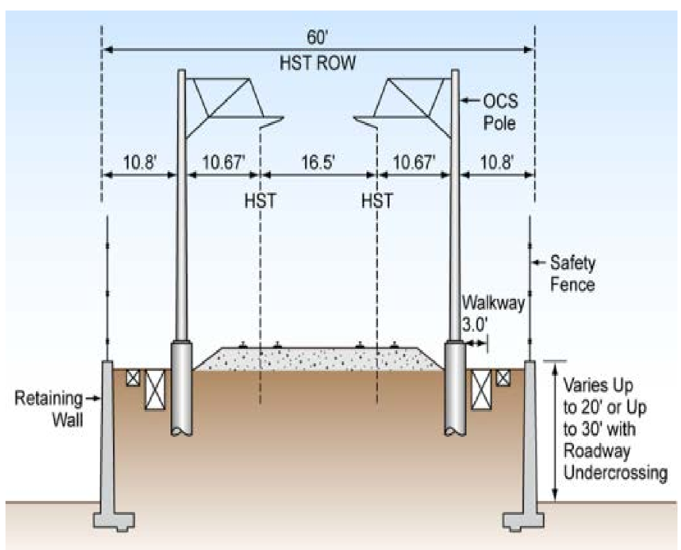


Figure A-4
Retained-fill typical cross section

A1.5.3 Below-Grade Trench Sections

Tracks set below grade (Figure A-5) near Fresno will include drainage systems to collect stormwater and direct it to a pump station. Stormwater will be pumped to the original ground outside the trench and released into a drainage facility at grade. The trench structural section will be constructed in developed areas near Fresno, and the new structures may have water quality and hydromodification impacts on these areas that must be mitigated as required by this WQTR. For HST operations, pump station discharges would not require a separate dewatering NPDES permit because discharges would consist solely of collected storm water contained in new drainage facilities and would be treated in BMPs prior to discharging to downstream storm drains.

The treatment strategy for this trench section will be to implement biofiltration swales at grade where feasible. Where soils are not adequate to provide infiltration capacity, compost-amended soils and infiltration devices could be implemented to address the water quality and hydromodification impacts. Where these treatment BMPs are not feasible secondary and other BMPs will be considered.

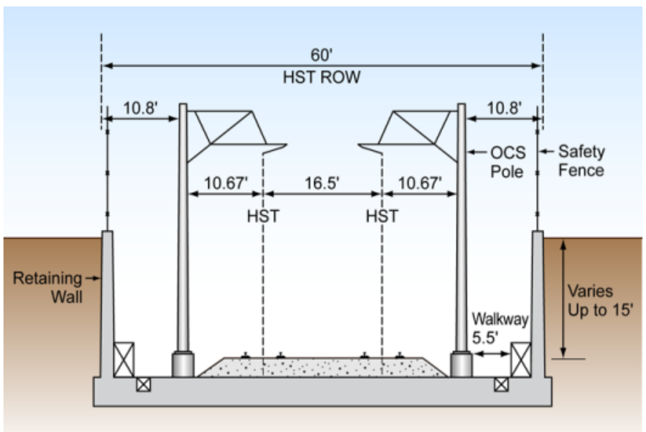


Figure A-5
Retained-cut typical cross section

A1.5.4 River and Creek Crossings

The HST will cross the Kings River Complex (Cole Slough, Dutch John Cut, Old Kings River)[5], Cross Creek, Tule River, Deer Creek, and Poso Creek (see Figures A-6 through A-12). The current design of the Kings River Complex and Cross Creek crossings include steel truss structures. Stormwater dispersal prior to the crossing is the most effective means to minimize water quality impacts. Sheet flow could be allowed to drain off the structure as soon as possible without collection. This will effectively minimize the concentration of flow and pollutants. At columns constructed on ground, collecting and conveying runoff via downspouts to grade would be used. The spacing for downspouts would match the bridge spans. Each downspout would have a miniscule watershed area in comparison to the overall river watershed, and minimal hydromodification impact. Design of the downspout would require a rip rap pad to protect from localized erosion at the discharge point.

[5] The Kings River moved from its original alignment during large storm events in 1861 and 1867. The main flow channel moved from its original alignment (Old Kings River) into Cole Slough, several miles upstream of the HST crossing. At the HST crossing location, the river returns to its original alignment through Dutch John Cut, which connects Cole Slough to the Kings River. At the crossing, Dutch John Cut conveys the main flow of the Kings River.

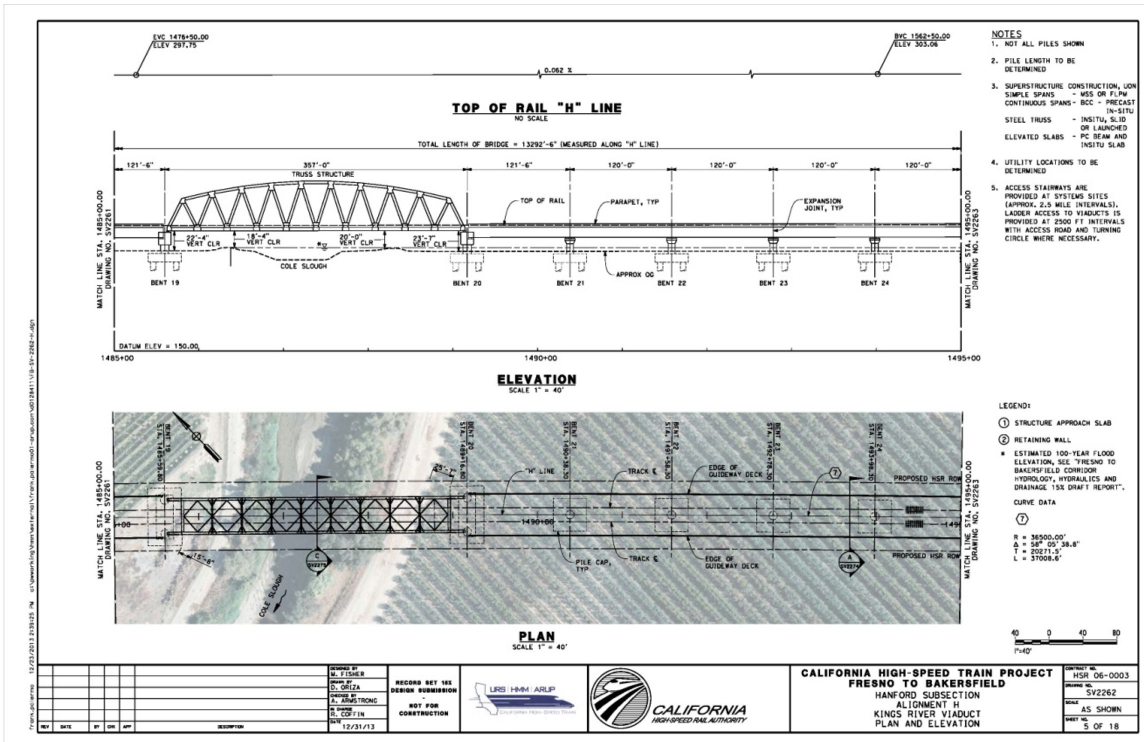


Figure A-6
Cole Slough crossing

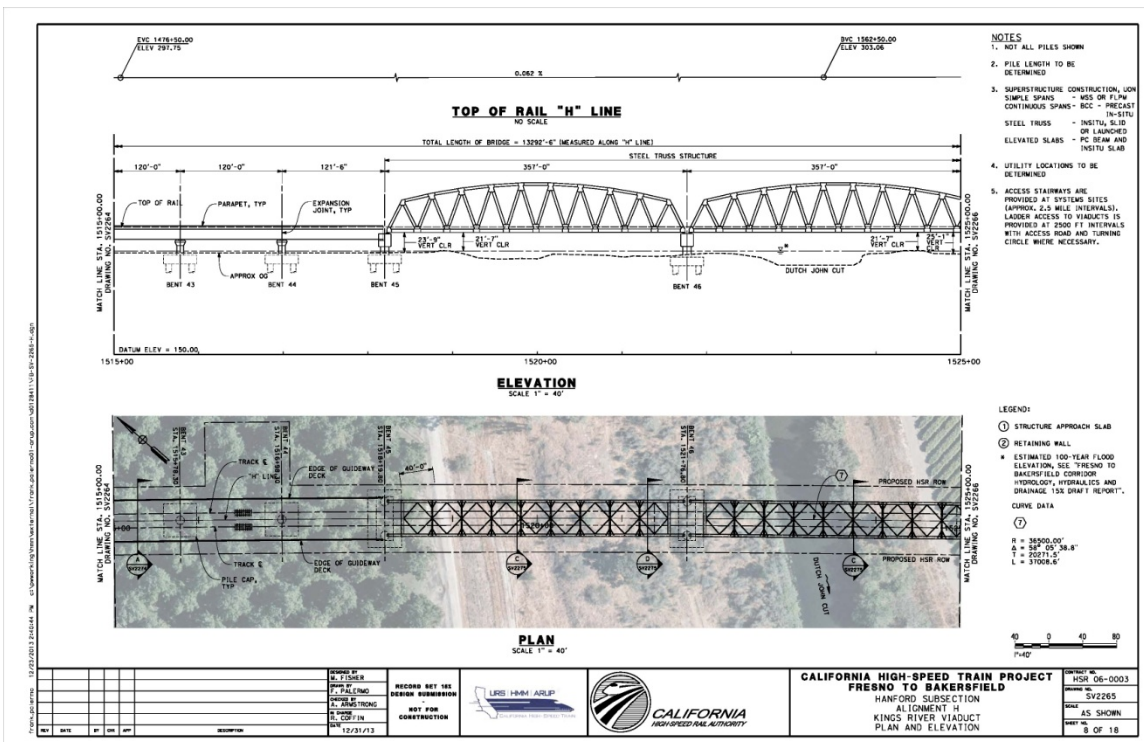
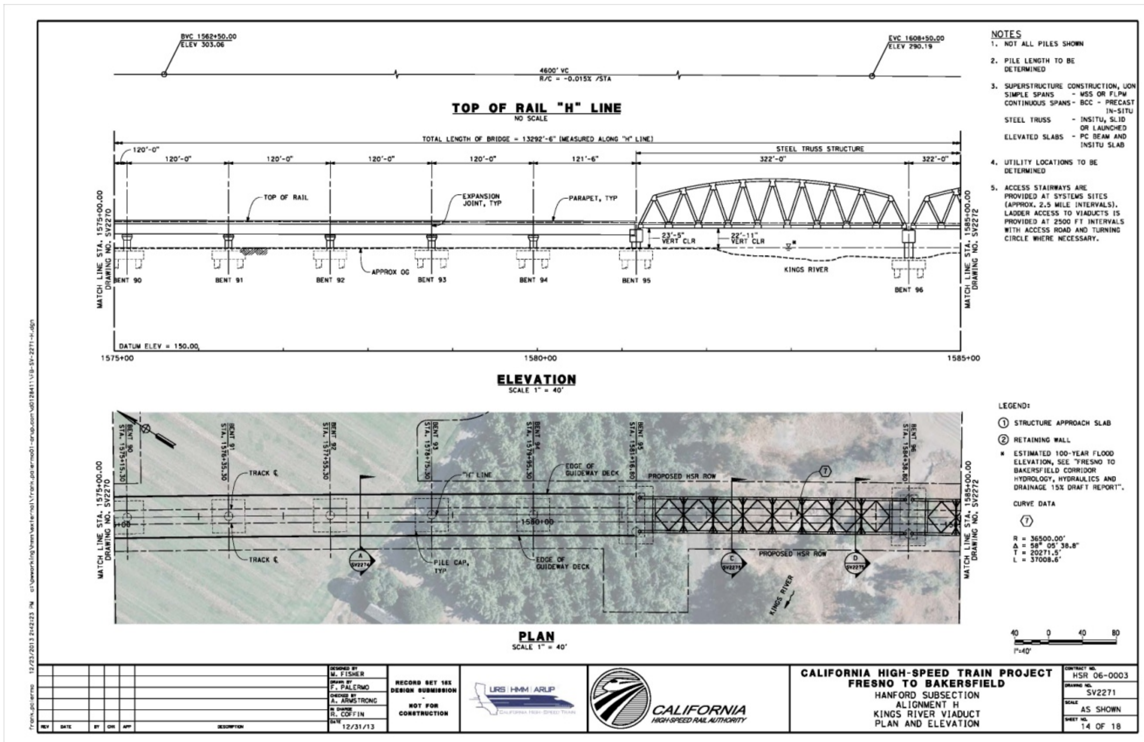


Figure A-7
Dutch John Cut crossing



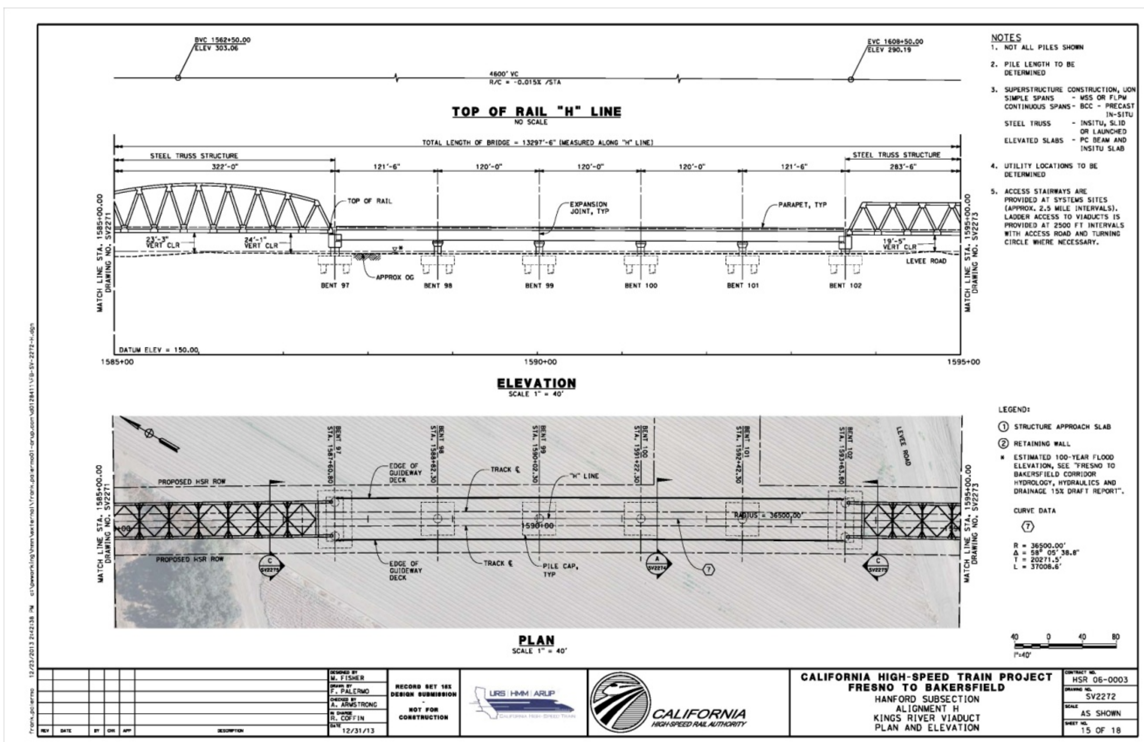
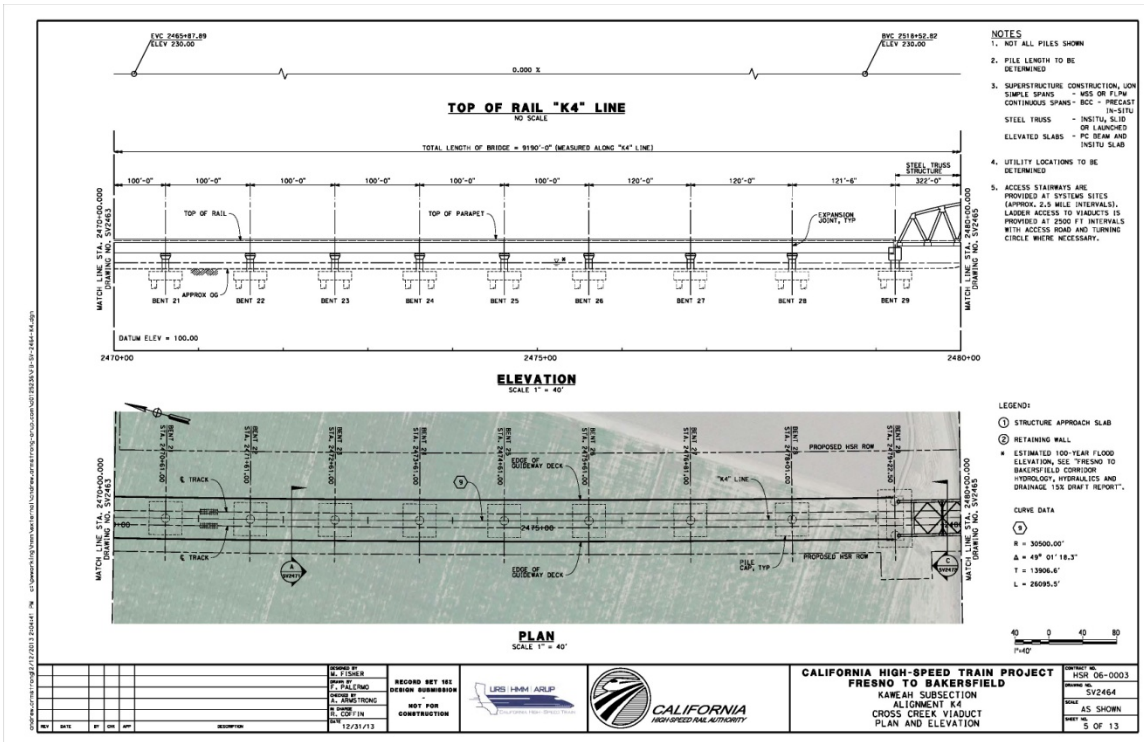


Figure A-8
Old Kings River crossing



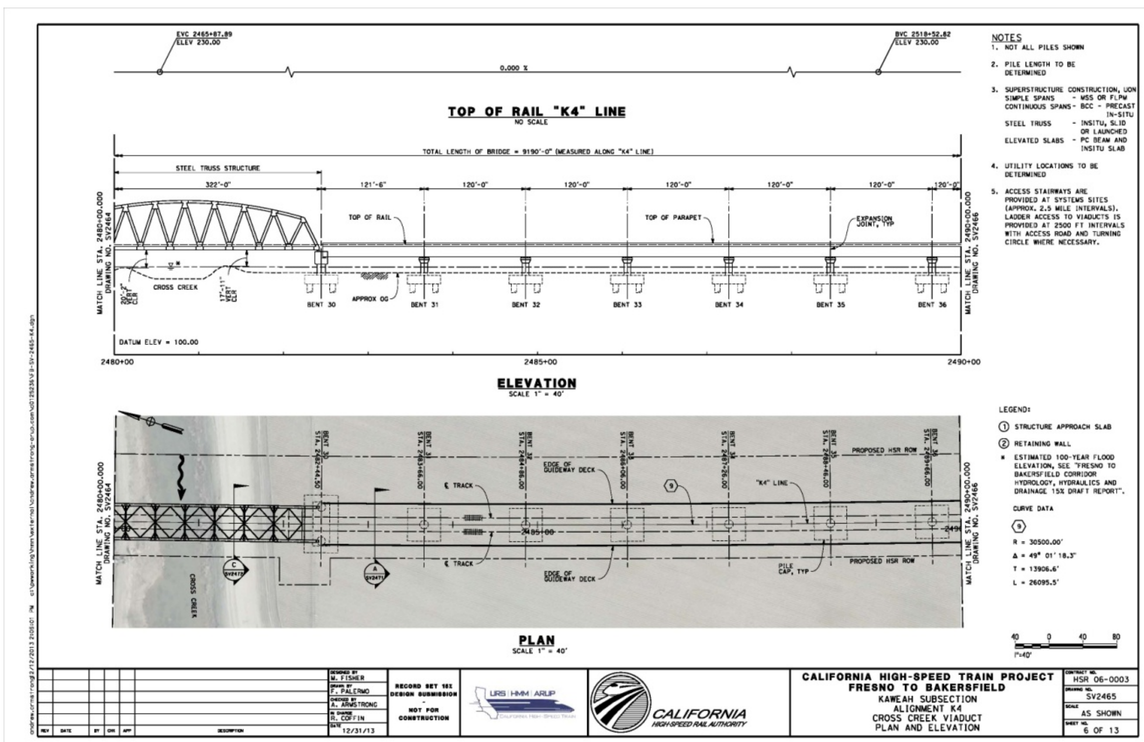


Figure A-9
Cross Creek crossing

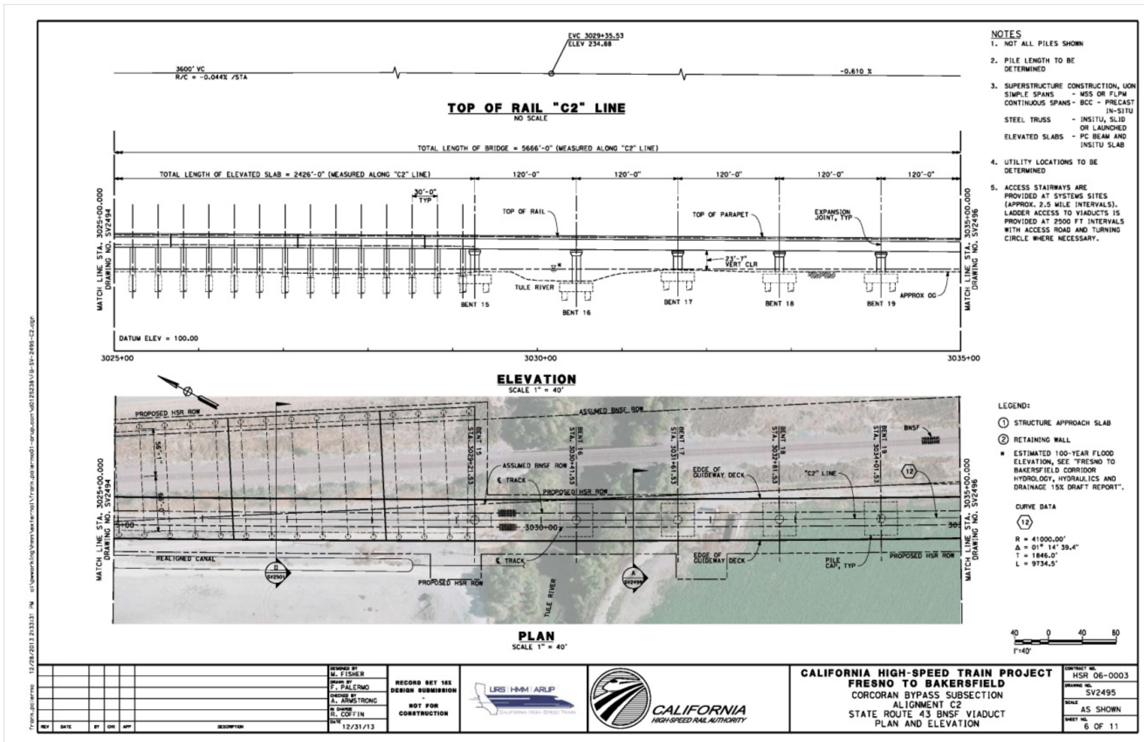


Figure A-10
Tule River crossing

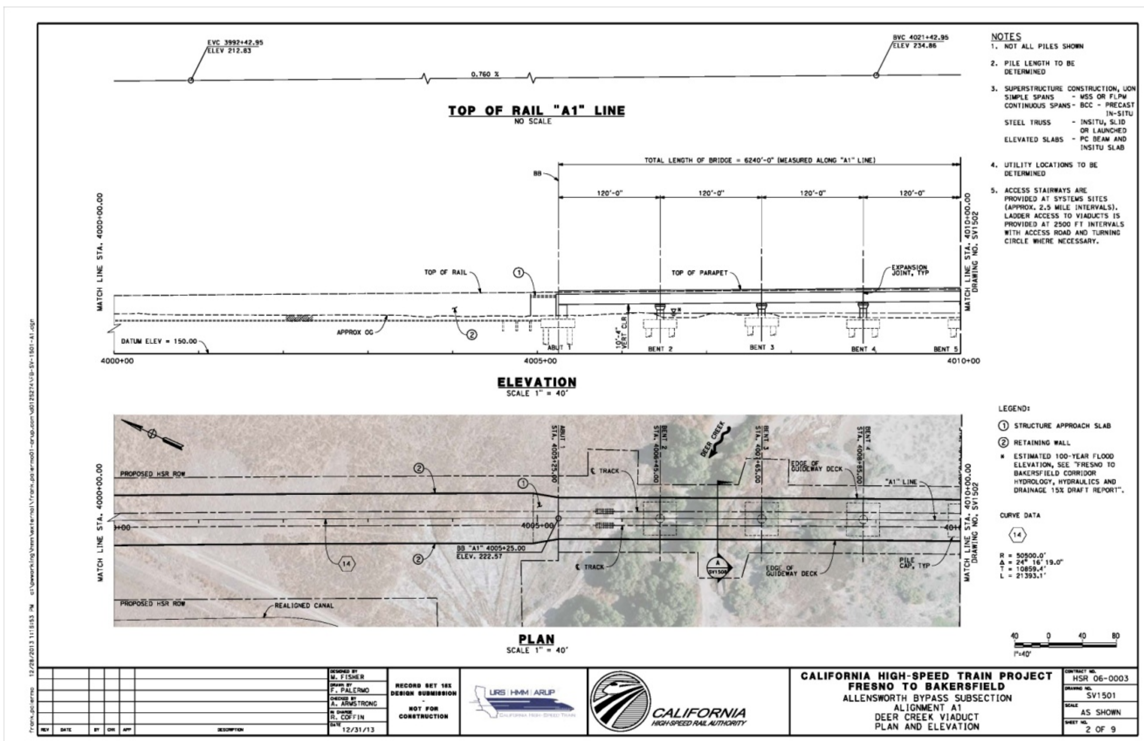


Figure A-11
Deer Creek crossing

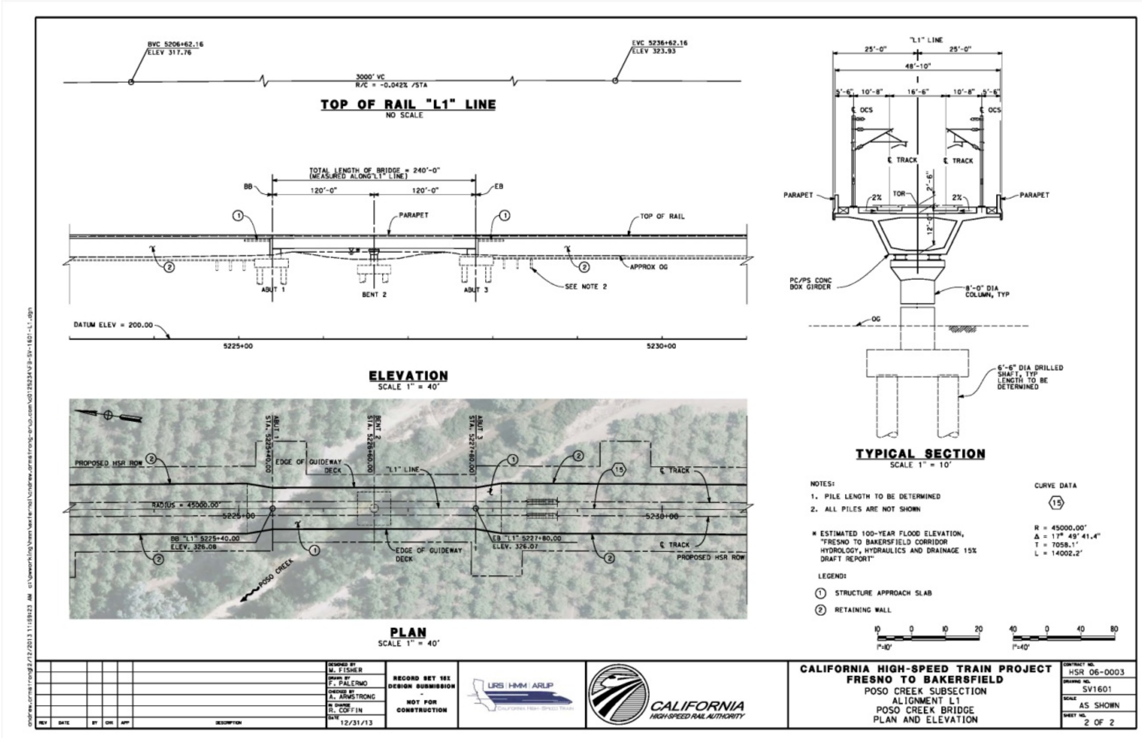


Figure A-12
Poso Creek crossing

A1.5.5 HST Station

The proposed Tulare/King regional HST station will be constructed just outside of the Hanford urban growth area in an area of flat agricultural land with permeable soils and would not be adjacent to water bodies. Runoff would be contained onsite and directed to an infiltration basin which is expected to have a negligible impact on hydromodification.

The proposed HST station facilities will include impervious surfaces in the forms of roofs, platforms, ramps, stairs, buildings, parking areas, and other hard structures. Some or all of these may be classified as pollutant-generating surfaces. The increased pedestrian presence and vehicle traffic at HST stations are expected to result in elevated levels of pollutant loading. The treatment strategy for HST stations will be to implement DPP BMPs such as permeable pavement, onsite infiltration, bioretention, and/or disconnected downspouts where feasible to provide pre-treatment and incidental volume reduction prior to discharge to a detention basin. This will meet the requirements of the post-construction standards for HST.

A1.5.6 Other HST Facilities

A1.5.6.1 Heavy Maintenance Facility

An HMF alternative might be selected in the Fresno to Bakersfield section. If it is selected, the HMF would cover a large area, about 154 acres. Most of that area will consist of impervious surfaces such as roofs, parking lots, and access roads that will produce large amounts of runoff. Given the large amount of onsite stormwater generated at the HMF, onsite detention will be considered to mitigate hydromodification impacts. For these sites, site design BMPs such as porous pavements and downspout disconnections may be incorporated to help mitigate the hydromodification impact.

For the HMF facility, the treatment strategy will be to incorporate biofiltration swales wherever feasible to capture and convey runoff from these impervious sites. Where bioswales and/or compost-amended bioswales cannot completely meet LID treatment requirements of this WQTR, additional infiltration devices will be considered where soil conditions are found to be appropriate. If onsite infiltration cannot be accomplished, then stormwater detention must be provided.

Industrial Activities. The HMF is expected to include industrial operations such as indoor and outdoor maintenance activities, chemical storage, fuel storage, and other industrial activities. It is anticipated that stormwater runoff from the HMF when operational will require a permit under the state's NPDES Industrial General Permit Program.

A1.5.6.2 Traction-Power Substations and Paralleling Stations

HST traction-power substations and paralleling stations in PP1 will include impervious surfaces in the form of access roads, parking lots, concrete electrical pads, access paths, and other hard structures. Some or all of these may contribute large amounts of runoff and would be classified as pollutant-generating surfaces. For these locations, site-design BMPs such as porous pavements and downspout disconnections may be incorporated to help mitigate the water quality and hydromodification impacts as required by this WQTR. The treatment strategy for these power substations and paralleling stations will be to incorporate biofiltration swales wherever feasible to capture and convey runoff from these impervious sites. Where bioswales and/or compost-amended bioswales cannot completely meet LID treatment requirements, additional infiltration devices will be considered where soil conditions are found to be appropriate. If onsite infiltration cannot be accomplished, then stormwater detention must be provided.

A1.5.7 Modifications to Caltrans Facilities

Generally, discharges from Caltrans right-of-way will be treated in accordance with the requirements of the Caltrans statewide general stormwater permit (Order No. 2012-011-DWQ) and the 2010 Caltrans PPDG. PP1 is anticipated to affect several overcrossings or interchanges, including modifications of existing drainage systems. For improvements to Caltrans right-of-way, stormwater BMPs will be used to attenuate, treat, and infiltrate runoff where feasible. At each location, a separate Storm Water Data Report (SWDR) will be prepared in compliance with the PPDG.

A1.5.8 Modifications to Facilities Owned by Local Agencies

Construction of improvements owned by local agencies may include construction of those facilities within right-of-way intended to be given to those agencies. For example, local roadway improvements will be provided for County roads and construction of new canal access roads outside the HST right-of-way may be turned over to the local irrigation district. These facilities may therefore be subject to other NPDES stormwater permits, such as the Fresno MS4 or the statewide Phase II Small MS4 General Permit.

Where these facilities are located within another MS4 boundary, the Contractor will coordinate with the Authority and the local agencies to develop a stormwater treatment BMP plan that meets the applicable requirements of either the relevant MS4 permit or these HST post-construction standards. It is anticipated that a similar menu of BMPs may be implemented using the same prioritization as this WQTR establishes for HST. The site suitability of the available BMPs must be considered.

Where these facilities are located within the Fresno MS4 boundary, compliance with that permit's conditions will meet or exceed the HST post-construction standards. The Contractor will develop

a treatment BMP Strategy and a Drainage and BMP Plan to meet the appropriate standards and document that in the WQMP.

A1.5.8.1 New Frontage Roads

PP1 will affect local frontage streets and intersections at many crossings in urbanized and rural areas. Other improvements may be required to maintain access to crossing utilities such as irrigation canals and other private and public utilities. Because of safety concerns surrounding the speed of the HST, there will be no at-grade crossings of the HST tracks. Existing streets and intersections will be modified where the HST is at-grade or in spatial conflict with existing overpasses. New access roads will be provided for crossing utilities.

For these improvements, the increased amount of paved area is anticipated to result in water quality and hydromodification impacts. Runoff from the new and replaced roadway pavement will require stormwater treatment and, in some cases, hydromodification control to meet post-construction standards in this WQTR.

These improvements are also long, narrow corridors that will be turned over to the local agencies. Where adjacent parcels are acquired and provide adequate space to implement infiltration devices, these BMPs should be implemented. In other locations, because land is at a premium, acquiring additional right-of-way for infiltration BMPs may make them infeasible. Biofiltration swales (amended with compost as needed) may be a suitable alternative to enhance treatment and hydromodification control for these facilities.

A1.5.8.2 Existing Public and Private Utilities

Existing public and private utilities may require extensions, new crossings, relocations, or other modifications of underground, at-grade, or overhead utilities as a result of HST to mitigate impacts to local agency facilities. Several agencies will be affected including the local Departments of Public Works, Pacific Gas and Electric Company (PG&E), Irrigation Districts, and various other public and private utility owners.

Construction of linear underground or overhead utilities improvements is not likely to result in substantial additional paved area, hydromodification, or other water quality impacts because the ground surface is expected to be repaired to match the existing conditions. At-grade construction of irrigation canals and other facilities may require new access roads and dedicated easements. For these facilities, some water quality or hydromodification impacts are anticipated. Because these areas are similar to new frontage roads, similar treatment BMPs may be implemented to meet the standards of this WQTR, as discussed above.

A1.5.8.3 Fresno Metropolitan Flood Control District

Construction of improvements to FMFCD facilities may be required to comply with the FMFCD master plan and the Fresno MS4 permit. These improvements would be subject to review, coordination, and approval by FMFCD. If required, it is recommended that the Contractor coordinate closely with the Authority and FMFCD during detailed design to develop a design that minimizes impacts on the FMFCD master plan of drainage.

A1.5.8.4 At-Grade Railroad Crossings

New at-grade railroad crossings may be needed to provide maintenance access to some HST and other facilities along the HST alignment, such as access to stream channels and irrigation canals between the HST and BNSF rights-of-way. Construction of these crossings will be outside of the HST right-of-way. These improvements will be subject to review, coordination, and approval of the California Public Utilities Commission and the owning rail company. Because these new rail

crossings typically require small areas, the water quality and hydromodification impacts from these facilities are anticipated to be minor. It is recommended that the Contractor coordinate closely with the Authority and these agencies during detailed design to assure any impacts are mitigated as required by this WQTR.

A1.6 References

Burkhardt, Michael, Luca Rossi, and Markus Boller. 2008. “Diffuse Release of Environmental Hazards by Railways.” *Desalination* 226:106-113.

———. 2007. *Caltrans Treatment Best Management Practices Technology Report*. Sacramento, CA.

———. 2009. *Compost and Low Impact Development Technical Memorandum, Contract 43A0172, Task Order 51.* January 2009.

———. 2010. *Storm Water Quality Handbooks, PPDG Project Planning and Design Guide.* CTSW-RT-10-254.03. Office of Storm Water Management – Design. Sacramento, CA. July 2010.

———. 2013. *T-1 Checklist Infiltration Tools v. 3.01 User Manual*. CTSW-SA-12-239.09.04. Sacrament, CA. February 28, 2013.

California Department of Water Resources. 2013. Water Efficient Landscape Ordinance. Sacramento, CA. http://www.water.ca.gov/wateruseefficiency/landscapeordinance/technical.cfm (accessed May 2013).

California High-Speed Rail Authority and Federal Railroad Administration (Authority and FRA). 2013a. *Fresno to Bakersfield Section Hydraulics and Floodplain Technical Report*, California High-Speed Train Project. Sacramento, CA, and Washington, D.C. April 2013.

———. 2013b. *Fresno to Bakersfield Section Stormwater Quality Management Report.* California High-Speed Train Project. Sacramento, CA, and Washington, D.C. December 2013.

———. 2014. *Final Environmental Impact Report/ Environmental Impact Statement (EIR/EIS) for the Fresno to Bakersfield Section of the California High-Speed Train (HST) Project.* Sacramento, CA, and Washington, DC. (In progress)

California Regional Water Quality Control Board, Central Valley (CVRWQCB). 2004. *Water Quality Control Plan from the Tulare Lake Basin*. 2nd ed. January 2004.

———. 2010. 2010 California 303(d) List of Water Quality Limited Segments.

———. 2013. Order No. R5-2013-0080, NPDES No. CA00883500. Waste Discharge Requirements for Fresno Metropolitan Flood Control District, City of Fresno, City of Clovis, County of Fresno, and California State University Fresno Storm Water Discharges from Municipal Separate Storm Sewer System Fresno County. May 2013.

California State Water Resources Control Board (SWRCB). 2009. Order No. 2009-0009-DWQ [As Amended by Order No. 2010-0014-DWQ]. National Pollutant Discharge Elimination System General Permit No. CAS000002 *Waste Discharge Requirements for Discharges of Storm Water Runoff Associated with Construction and Land Disturbance Activities*. Adopted September 2, 2009, as modified on November 16, 2010.

———. 2010. *2010 Integrated Report* (Clean Water Act Section 303[d] List / 305[b] Report).

———. 2012. *Order No. 2012-011-DWQ, NPDES No. CAS000003, National Pollutant Discharge Elimination System (NPDES) Statewide Storm Water Permit Waste Discharge Requirements (WDRS) for State of California Department of Transportation.* September.

California Stormwater Quality Association. 2009. *Stormwater Best Management Practice Handbook, New Development and Redevelopment*. January 2003, updated September 30, 2004.

CH2M HILL and URS. 2013. *Technical Memorandum – California High-Speed Train Project, Merced to Fresno Section Post-Construction Stormwater Quality Standards.* February 2013.

County of Los Angeles. 2009. *Low Impact Development Standards Manual*. January 2009.

Low Impact Development Center Inc. 2010. *Low Impact Development Manual for Southern California: Technical Guidance and Site Planning Strategies Prepared for the Southern California Stormwater Monitoring Coalition in cooperation with the State Water Resources Control Board.* April 2010.

Regional Transportation District (Denver, Colorado). 2011. *Final Report: Modeling Ballasted Tracks for Pollutant and C Value for Regional Transportation District, Denver, Colorado*. Prepared by Albert Molinas, Ph.D., Hydrau-Tech, Inc. April 2011.

This page intentionally left blank

Attachment 4

Impacted Waterbodies in the PP1 Study Area

Index	Feature ID	Type	Construction Package	Basin Plan HUC	Basin Plan Watershed Name	USGS HUC	USGS Watershed Name	Latitude	Longitude	Direct Permanent (acres)	Direct Permanent (CY)	Mitigation Ratio (n:1)	Mitigation Acreage	Mitigation Location	Direct Temporary (acres)	Direct Temporary No Fill (acres)	Indirect Bisect (acres)	Mitigation Ratio (n:1)	Mitigation acreage (On-site, in Kind)	Additional Mitigation	Additional Mitigation Location	Notes
1	027AOW03	Canals/Ditches	CP1C	551.3	Fresno	18030009	Upper Dry	36.697021	-119.758865	0.04	491	TBD	TBD	TBD	0.00	0.00	NA	TBD	TBD	TBD	TBD	
2	CCE2OW	Canals/Ditches	CP1C	551.3	Fresno	18030009	Upper Dry	36.695579	-119.757322	0.04	475	TBD	TBD	TBD	0.02	0.04	NA	TBD	TBD	TBD	TBD	
3	031FOW01	Canals/Ditches	CP1C	551.3	Fresno	18030009	Upper Dry	36.686401	-119.75363	0.05	694	TBD	TBD	TBD	0.19	0	NA	TBD	TBD	TBD	TBD	
4	031FOW05	Retention/Detention basin	CP1C	551.3	Fresno	18030009	Upper Dry	36.682143	-119.753881	0	0	TBD	TBD	TBD	0.43	0	NA	TBD	TBD	TBD	TBD	
5	035DOW01	Canals/Ditches	CP1C	551.3	Fresno	18030009	Upper Dry	36.681993	-119.750428	0	0	TBD	TBD	TBD	0.47	0	NA	TBD	TBD	TBD	TBD	
6	034EOW04	Canals/Ditches	CP1C	551.3	Fresno	18030009	Upper Dry	36.679463	-119.753673	0	0	TBD	TBD	TBD	0.37	0	NA	TBD	TBD	TBD	TBD	
7	034PIOW01	Canals/Ditches	CP1C	551.3	Fresno	18030009	Upper Dry	36.679106	-119.752538	0.03	352	TBD	TBD	TBD	0.36	0	NA	TBD	TBD	TBD	TBD	
8	034EOW01	Retention/Detention basin	CP1C	551.3	Fresno	18030009	Upper Dry	36.678507	-119.754171	0.06	926	TBD	TBD	TBD	0.59	0	NA	TBD	TBD	TBD	TBD	
9	034EOW02	Canals/Ditches	CP1C	551.3	Fresno	18030009	Upper Dry	36.677933	-119.750353	0.24	3143	TBD	TBD	TBD	0.56	0	NA	TBD	TBD	TBD	TBD	
10	CCE220OW	Canals/Ditches	CP1C	551.3	Fresno	18030009	Upper Dry	36.672486	-119.75101	0.01	122	TBD	TBD	TBD	0	0	NA	TBD	TBD	TBD	TBD	
11	1205WL47	Seasonal wetland	CP1C	551.3	Fresno	18030009	Upper Dry	36.667486	-119.750492	0.00	7	TBD	TBD	TBD	0	0	NA	TBD	TBD	TBD	TBD	
12	037EOW02	Canals/Ditches	CP1C	551.3	Fresno	18030009	Upper Dry	36.666214	-119.749529	0	0	TBD	TBD	TBD	0.01	0	NA	TBD	TBD	TBD	TBD	
13	036DOW01	Canals/Ditches	CP1C	551.3	Fresno	18030009	Upper Dry	36.666206	-119.751192	0.07	853	TBD	TBD	TBD	0.01	0	NA	TBD	TBD	TBD	TBD	
14	042EOW01	Canals/Ditches	CP 2/3	551.3	Fresno	18030009	Upper Dry	36.652512	-119.751859	0.14	1838	TBD	TBD	TBD	0.04	0	NA	TBD	TBD	TBD	TBD	
15	043DOW01	Canals/Ditches	CP 2/3	551.3	Fresno	18030009	Upper Dry	36.649877	-119.75037	0.02	245	TBD	TBD	TBD	0	0	NA	TBD	TBD	TBD	TBD	
16	046DOW02	Canals/Ditches	CP 2/3	551.3	Fresno	18030009	Upper Dry	36.643641	-119.75066	0.10	1319	TBD	TBD	TBD	0	0	NA	TBD	TBD	TBD	TBD	
17	047COW01	Canals/Ditches	CP 2/3	551.3	Fresno	18030009	Upper Dry	36.639268	-119.751409	0.10	1240	TBD	TBD	TBD	0.02	0	NA	TBD	TBD	TBD	TBD	
18	052BOW01	Canals/Ditches	CP 2/3	551.7	Consolidated	18030009	Upper Dry	36.620016	-119.752549	1.01	12998	TBD	TBD	TBD	0.04	0	NA	TBD	TBD	TBD	TBD	
19	061COW01	Retention/Detention basin	CP 2/3	551.7	Consolidated	18030009	Upper Dry	36.579173	-119.746312	0.03	493	TBD	TBD	TBD	0	0	NA	TBD	TBD	TBD	TBD	
20	064COW01	Canals/Ditches	CP 2/3	551.7	Consolidated	18030009	Upper Dry	36.576734	-119.745988	0.05	645	TBD	TBD	TBD	0	0	NA	TBD	TBD	TBD	TBD	
21	064COW02	Canals/Ditches	CP 2/3	551.7	Consolidated	18030009	Upper Dry	36.576725	-119.745484	0.08	993	TBD	TBD	TBD	0	0	NA	TBD	TBD	TBD	TBD	
22	067BOW01	Canals/Ditches	CP 2/3	551.7	Consolidated	18030009	Upper Dry	36.563224	-119.742182	0.11	1426	TBD	TBD	TBD	0.02	0	NA	TBD	TBD	TBD	TBD	
23	CCE19OW	Canals/Ditches	CP 2/3	551.7	Consolidated	18030009	Upper Dry	36.561362	-119.735106	0.13	1699	TBD	TBD	TBD	0	0	NA	TBD	TBD	TBD	TBD	
24	070BOW01	Canals/Ditches	CP 2/3	551.7	Consolidated	18030009	Upper Dry	36.557342	-119.738814	0.09	1201	TBD	TBD	TBD	0.03	0	NA	TBD	TBD	TBD	TBD	
25	BN20OW01	Canals/Ditches	CP 2/3	551.7	Consolidated	18030009	Upper Dry	36.550014	-119.732807	0.04	452	TBD	TBD	TBD	0	0	NA	TBD	TBD	TBD	TBD	
26	073BOW01	Canals/Ditches	CP 2/3	551.7	Consolidated	18030009	Upper Dry	36.549007	-119.733049	0.66	8576	TBD	TBD	TBD	0.71	0	NA	TBD	TBD	TBD	TBD	
27	CCE20OW	Canals/Ditches	CP 2/3	551.2	Raisin	18030009	Upper Dry	36.461168	-119.640522	0.31	4032	TBD	TBD	TBD	0.21	0	NA	TBD	TBD	TBD	TBD	
28	CCE21OW	Canals/Ditches	CP 2/3	551.2	Raisin	18030009	Upper Dry	36.459181	-119.640483	0.15	1876	TBD	TBD	TBD	0.15	0	NA	TBD	TBD	TBD	TBD	
29	CCE21SW	Riparian	CP 2/3	551.2	Raisin	18030012	Tulare-Buena Vista Lakes	36.454297	-119.629664	0.079198	128	TBD	TBD	TBD	0.02	NA	NA	TBD	TBD	TBD	TBD	
30	CCE22OW	Seasonal riverine	CP 2/3	551.2	Raisin	18030012	Tulare-Buena Vista Lakes	36.454148	-119.629644	0	0	TBD	TBD	TBD	0.03	0.11	NA	TBD	TBD	TBD	TBD	Cole Slough
31	CCE26SW	Riparian	CP 2/3	551.2	Raisin	18030012	Tulare-Buena Vista Lakes	36.453947	-119.629629	0.138468	223	TBD	TBD	TBD	0.03	NA	NA	TBD	TBD	TBD	TBD	
32	CCE28OW	Seasonal riverine	CP 2/3	551.2	Raisin	18030012	Tulare-Buena Vista Lakes	36.446599	-119.62287	0	0	TBD	TBD	TBD	0.08	0.31	NA	TBD	TBD	TBD	TBD	Dutch John Cut
33	CCE29SW	Riparian	CP 2/3	551.2	Raisin	18030012	Tulare-Buena Vista Lakes	36.446137	-119.622276	0.114539	185	TBD	TBD	TBD	0.03	NA	NA	TBD	TBD	TBD	TBD	
34	CCE27SW	Riparian	CP 2/3	551.2	Raisin	18030012	Tulare-Buena Vista Lakes	36.445753	-119.624816	0.48	770	TBD	TBD	TBD	0.12	NA	NA	TBD	TBD	TBD	TBD	
35	CCE31SW	Riparian	CP 2/3	551.9	Hanford-Lemoore	18030012	Tulare-Buena Vista Lakes	36.43207	-119.61063	0.24	384	TBD	TBD	TBD	0.13	NA	NA	TBD	TBD	TBD	TBD	
36	CCE30OW	Seasonal riverine	CP 2/3	551.9	Hanford-Lemoore	18030012	Tulare-Buena Vista Lakes	36.431089	-119.611749	0.00	12	TBD	TBD	TBD	0.11	0.23	NA	TBD	TBD	TBD	TBD	Old Kings River
37	CCE32OW	Canals/Ditches	CP 2/3	551.9	Hanford-Lemoore	18030012	Tulare-Buena Vista Lakes	36.429891	-119.609992	0	0	TBD	TBD	TBD	0.01	0.05	NA	TBD	TBD	TBD	TBD	
38	CCE34OW	Canals/Ditches	CP 2/3	551.9	Hanford-Lemoore	18030012	Tulare-Buena Vista Lakes	36.403876	-119.595642	0.61	7827	TBD	TBD	TBD	0.18	0	NA	TBD	TBD	TBD	TBD	
39	CCE36OW	Canals/Ditches	CP 2/3	551.9	Hanford-Lemoore	18030012	Tulare-Buena Vista Lakes	36.371985	-119.586747	0.96	12356	TBD	TBD	TBD	0.04	0	NA	TBD	TBD	TBD	TBD	
40	CCE37OW	Canals/Ditches	CP 2/3	551.9	Hanford-Lemoore	18030012	Tulare-Buena Vista Lakes	36.367627	-119.591808	0.62	7964	TBD	TBD	TBD	0.13	0	NA	TBD	TBD	TBD	TBD	
41	CCE38OW	Retention/Detention basin	CP 2/3	551.9	Hanford-Lemoore	18030012	Tulare-Buena Vista Lakes	36.362918	-119.591618	0.13	2026	TBD	TBD	TBD	0	0	NA	TBD	TBD	TBD	TBD	
42	CCE39OW	Retention/Detention basin	CP 2/3	551.9	Hanford-Lemoore	18030012	Tulare-Buena Vista Lakes	36.362767	-119.591623	0.16	2649	TBD	TBD	TBD	0	0	NA	TBD	TBD	TBD	TBD	
43	CCE40OW	Retention/Detention basin	CP 2/3	551.9	Hanford-Lemoore	18030012	Tulare-Buena Vista Lakes	36.362325	-119.591533	0.36	5736	TBD	TBD	TBD	0	0	NA	TBD	TBD	TBD	TBD	
44	CCE41OW	Retention/Detention basin	CP 2/3	551.9	Hanford-Lemoore	18030012	Tulare-Buena Vista Lakes	36.362314	-119.591792	0.24	3812	TBD	TBD	TBD	0	0	NA	TBD	TBD	TBD	TBD	
45	159FOW01	Canals/Ditches	CP 2/3	551.9	Hanford-Lemoore	18030012	Tulare-Buena Vista Lakes	36.32084	-119.591323	0	0	TBD	TBD	TBD	0.01	0.03	NA	TBD	TBD	TBD	TBD	
46	162FOW01	Canals/Ditches	CP 2/3	551.9	Hanford-Lemoore	18030012	Tulare-Buena Vista Lakes	36.320079	-119.591508	0	0	TBD	TBD	TBD	0.02	0.08	NA	TBD	TBD	TBD	TBD	
47	180BOW02	Canals/Ditches	CP 2/3	551.9, 558.1	Hanford-Lemoore, Kaweah Delta	18030012	Tulare-Buena Vista Lakes	36.305308	-119.592003	0.34	4375	TBD	TBD	TBD	0.12	0	NA	TBD	TBD	TBD	TBD	
48	177PIOW01	Canals/Ditches	CP 2/3	551.9	Hanford-Lemoore	18030012	Tulare-Buena Vista Lakes	36.287559	-119.591116	0.01	67	TBD	TBD	TBD	0	0	NA	TBD	TBD	TBD	TBD	
49	1205OW03	Retention/Detention basin	CP 2/3	558.1	Kaweah Delta	18030012	Tulare-Buena Vista Lakes	36.284449	-119.592291	0.22	3532	TBD	TBD	TBD	0	0	NA	TBD	TBD	TBD	TBD	
50	180BOW01	Canals/Ditches	CP 2/3	558.1	Kaweah Delta	18030012	Tulare-Buena Vista Lakes	36.276688	-119.591101	0.04	527	TBD	TBD	TBD	0.01	0	NA	TBD	TBD	TBD	TBD	
51	CCE50OW	Canals/Ditches	CP 2/3	558.1	Kaweah Delta	18030012	Tulare-Buena Vista Lakes	36.269537	-119.595655	0.20	2632	TBD	TBD	TBD	0	0	NA	TBD	TBD	TBD	TBD	
52	185BOW01	Canals/Ditches	CP 2/3	558.1	Kaweah Delta	18030012	Tulare-Buena Vista Lakes	36.269308	-119.591689	2.25	29036	TBD	TBD	TBD	0.03	0	NA	TBD	TBD	TBD	TBD	
53	186BOW01	Canals/Ditches	CP 2/3	558.1	Kaweah Delta	18030012	Tulare-Buena Vista Lakes	36.262227	-119.591431	0.01	159	TBD	TBD	TBD	0.01	0	NA	TBD	TBD	TBD	TBD	
54	190BOW02	Canals/Ditches	CP 2/3	558.1	Kaweah Delta	18030012	Tulare-Buena Vista Lakes	36.25476	-119.590884	1.56	20151	TBD	TBD	TBD	0.16	0	NA	TBD	TBD	TBD	TBD	
55	198BOW02	Canals/Ditches	CP 2/3	558.1	Kaweah Delta	18030012	Tulare-Buena Vista Lakes	36.240305	-119.598628	0.24	3141	TBD	TBD	TBD	0	0	NA	TBD	TBD	TBD	TBD	
56	CCE204OW	Canals/Ditches	CP 2/3	558.1	Kaweah Delta	18030012	Tulare-Buena Vista Lakes	36.240205	-119.600534	1.17	15149	TBD	TBD	TBD	0	0	NA	TBD	TBD	TBD	TBD	
57	CCE53OW	Canals/Ditches	CP 2/3	558.1	Kaweah Delta	18030012	Tulare-Buena Vista Lakes	36.240176	-119.605414	0.02	224	TBD	TBD	TBD	0.01	0	NA	TBD	TBD	TBD	TBD	
58	1205OW04	Retention/Detention basin	CP 2/3	558.1	Kaweah Delta	18030012	Tulare-Buena Vista Lakes	36.217311	-119.609431	0.45	7288	TBD	TBD	TBD	0	0	NA	TBD	TBD	TBD	TBD	
59	CCE54OW	Retention/Detention basin	CP 2/3	558.1	Kaweah Delta	18030012	Tulare-Buena Vista Lakes	36.21603	-119.609043	0.08	1291	TBD	TBD	TBD	0	0	NA	TBD	TBD	TBD	TBD	
60	CCE55OW	Seasonal riverine	CP 2/3	558.1	Kaweah Delta	18030012	Tulare-Buena Vista Lakes	36.211604	-119.619932	0.24	786	TBD	TBD	TBD	0	0	NA	TBD	TBD	TBD	TBD	Guernsey Slough
61	CCE219OW	Canals/Ditches	CP 2/3	558.1	Kaweah Delta	18030012	Tulare-Buena Vista Lakes	36.211134	-119.604125	0.33	4215	TBD	TBD	TBD	0	0	NA	TBD	TBD	TBD	TBD	
62	CCE59OW	Canals/Ditches	CP 2/3	558.1	Kaweah Delta	18030012	Tulare-Buena Vista Lakes	36.210843	-119.609583	0.23	2978	TBD	TBD	TBD	0.01	0	NA	TBD	TBD	TBD	TBD	
63	CCE58OW	Seasonal riverine	CP 2/3	558.1	Kaweah Delta	18030012	Tulare-Buena Vista Lakes	36.210564	-119.620158	0.18	572	TBD	TBD	TBD	0	0	NA	TBD	TBD	TBD	TBD	Guernsey Slough
64	CCE218OW	Canals/Ditches	CP 2/3	558.1	Kaweah Delta	18030012	Tulare-Buena Vista Lakes	36.207293	-119.611432	0.04	474	TBD	TBD	TBD	0.03	0	NA	TBD	TBD	TBD	TBD	
65	CCE60SW	Emergent wetland	CP 2/3	558.1	Kaweah Delta	18030012	Tulare-Buena Vista Lakes	36.202477	-119.612986	0.01	20	TBD	TBD	TBD	0	0	NA	TBD	TBD	TBD	TBD	
66	CCE61OW	Seasonal riverine	CP 2/3	558.1	Kaweah Delta	18030012	Tulare-Buena Vista Lakes	36.202312	-119.614236	1.63	5272	TBD	TBD	TBD	0	0	NA	TBD	TBD	TBD	TBD	Guernsey Slough
67	CCE65OW	Canals/Ditches	CP 2/3	558.3	Lake Sump	18030012	Tulare-Buena Vista Lakes	36.196371	-119.613347	0.06	820	TBD	TBD	TBD	0.02	0	NA	TBD	TBD	TBD	TBD	
68	CCE68OW	Canals/Ditches	CP 2/3	558.3	Lake Sump	18030012	Tulare-Buena Vista Lakes	36.196335	-119.610723	0.05	633	TBD	TBD	TBD	0	0	NA	TBD	TBD	TBD	TBD	

Index	Feature ID	Type	Construction Package	Basin Plan HUC	Basin Plan Watershed Name	USGS HUC	USGS Watershed Name	Latitude	Longitude	Direct Permanent (acres)	Direct Permanent (CY)	Mitigation Ratio (n:1)	Mitigation Acreage	Mitigation Location	Direct Temporary (acres)	Direct Temporary No Fill (acres)	Indirect Bisect (acres)	Mitigation Ratio (n:1)	Mitigation acreage (On-site, in Kind)	Additional Mitigation	Additional Mitigation Location	Notes
69	CCE73OW	Canals/Ditches	CP 2/3	558.3	Lake Sump	18030012	Tulare-Buena Vista Lakes	36.189171	-119.612319	0	0	TBD	TBD	TBD	0.02	0	NA	TBD	TBD	TBD	TBD	
70	513OW13	Canals/Ditches	CP 2/3	558.3	Lake Sump	18030012	Tulare-Buena Vista Lakes	36.189067	-119.610759	0.09	1202	TBD	TBD	TBD	0.02	0	NA	TBD	TBD	TBD	TBD	
71	CCE69OW	Canals/Ditches	CP 2/3	558.3	Lake Sump	18030012	Tulare-Buena Vista Lakes	36.181989	-119.609744	0.11	1412	TBD	TBD	TBD	0.05	0	NA	TBD	TBD	TBD	TBD	
72	CCE78OW	Canals/Ditches	CP 2/3	558.3	Lake Sump	18030012	Tulare-Buena Vista Lakes	36.181788	-119.609847	0.13	1708	TBD	TBD	TBD	0.06	0	NA	TBD	TBD	TBD	TBD	
73	CCE79OW	Seasonal riverine	CP 2/3	558.3	Lake Sump	18030012, 18030007	Tulare-Buena Vista Lakes, Upper Kaweah	36.172923	-119.607885	0	0	TBD	TBD	TBD	0.02	0.26	NA	TBD	TBD	TBD	TBD	Cross Creek
74	1205OW11	Retention/Detention basin	CP 2/3	558.3	Lake Sump	18030007	Upper Kaweah	36.167534	-119.604542	0	0	TBD	TBD	TBD	0	0.03	NA	TBD	TBD	TBD	TBD	Temporary-No Fill Impacts Only
75	CCE86OW	Canals/Ditches	CP 2/3	558.3	Lake Sump	18030007	Upper Kaweah	36.159518	-119.600963	0.40	5185	TBD	TBD	TBD	0.06	0.00	NA	TBD	TBD	TBD	TBD	
76	1029OW01	Canals/Ditches	CP 2/3	558.3	Lake Sump	18030007	Upper Kaweah	36.157237	-119.5991	0.03	354	TBD	TBD	TBD	0.08	0.11	NA	TBD	TBD	TBD	TBD	
77	PI06WL	Retention/Detention basin	CP 2/3	558.3	Lake Sump	18030007	Upper Kaweah	36.15638	-119.59711	2.89	46699	TBD	TBD	TBD	6.85	0	NA	TBD	TBD	TBD	TBD	
78	CCE87OW	Canals/Ditches	CP 2/3	558.3	Lake Sump	18030007	Upper Kaweah	36.149714	-119.592234	0.58	7428	TBD	TBD	TBD	0.09	0	NA	TBD	TBD	TBD	TBD	
79	CCE89OW	Canals/Ditches	CP 2/3	558.1	Kaweah Delta	18030007	Upper Kaweah	36.139134	-119.584831	0.53	6792	TBD	TBD	TBD	0.21	0	NA	TBD	TBD	TBD	TBD	
80	CCE94OW	Canals/Ditches	CP 2/3	558.1, 558.3	Kaweah Delta, Lake Sump	18030007	Upper Kaweah	36.137762	-119.587471	0.32	4128	TBD	TBD	TBD	0.16	0	NA	TBD	TBD	TBD	TBD	
81	CCE98OW	Canals/Ditches	CP 2/3	558.1	Kaweah Delta	18030007	Upper Kaweah	36.136665	-119.58521	0.08	987	TBD	TBD	TBD	0.02	0	NA	TBD	TBD	TBD	TBD	
82	240HOW03	Canals/Ditches	CP 2/3	558.1	Kaweah Delta	18030007	Upper Kaweah	36.13469	-119.574258	0.86	11145	TBD	TBD	TBD	0.39	0	NA	TBD	TBD	TBD	TBD	
83	620OW01	Canals/Ditches	CP 2/3	558.3	Lake Sump	18030007	Upper Kaweah	36.123488	-119.570535	0.15	1993	TBD	TBD	TBD	0.05	0	NA	TBD	TBD	TBD	TBD	
84	CCE100OW	Canals/Ditches	CP 2/3	558.3	Lake Sump	18030007	Upper Kaweah	36.113422	-119.557763	2.80	36110	TBD	TBD	TBD	0.65	0	NA	TBD	TBD	TBD	TBD	
85	256GOW02	Canals/Ditches	CP 2/3	558.3	Lake Sump	18030007	Upper Kaweah	36.110897	-119.550388	0.23	2926	TBD	TBD	TBD	0.06	0	NA	TBD	TBD	TBD	TBD	
86	CCE103OW	Retention/Detention basin	CP 2/3	558.3	Lake Sump	18030007	Upper Kaweah	36.109235	-119.552395	0.22	3506	TBD	TBD	TBD	0	0	NA	TBD	TBD	TBD	TBD	
87	CCE105OW	Canals/Ditches	CP 2/3	558.3	Lake Sump	18030007	Upper Kaweah	36.108861	-119.556596	0.13	1662	TBD	TBD	TBD	0.12	0	NA	TBD	TBD	TBD	TBD	
88	CCE107OW	Canals/Ditches	CP 2/3	558.3	Lake Sump	18030007	Upper Kaweah	36.108448	-119.559355	0.01	183	TBD	TBD	TBD	0	0	NA	TBD	TBD	TBD	TBD	
89	CCE110OW	Canals/Ditches	CP 2/3	558.3	Lake Sump	18030007	Upper Kaweah	36.108301	-119.554213	0.17	2192	TBD	TBD	TBD	0.27	0	NA	TBD	TBD	TBD	TBD	
90	513OW08	Retention/Detention basin	CP 2/3	558.1	Kaweah Delta	18030007	Upper Kaweah	36.094312	-119.5364	0.00	63	TBD	TBD	TBD	0	0	NA	TBD	TBD	TBD	TBD	
91	412OW02	Canals/Ditches	CP 2/3	558.1, 558.3	Kaweah Delta, Lake Sump	18030007	Upper Kaweah	36.086958	-119.538145	0.13	1716	TBD	TBD	TBD	0	0	NA	TBD	TBD	TBD	TBD	
92	272PISW01	Retention/Detention basin	CP 2/3	558.3	Lake Sump	18030007	Upper Kaweah	36.086831	-119.539686	0.07	1076	TBD	TBD	TBD	0	0	NA	TBD	TBD	TBD	TBD	
93	CCE113OW	Canals/Ditches	CP 2/3	558.2	Tule Delta	18030007	Upper Kaweah	36.079881	-119.532636	0.13	1632	TBD	TBD	TBD	0.07	0	NA	TBD	TBD	TBD	TBD	
94	CCE119OW	Canals/Ditches	CP 2/3	558.2	Tule Delta	18030007	Upper Kaweah	36.065332	-119.527532	0.20	2574	TBD	TBD	TBD	0	0	NA	TBD	TBD	TBD	TBD	
95	PI04OW	Canals/Ditches	CP 2/3	558.2	Tule Delta	18030007	Upper Kaweah	36.060732	-119.525798	0.03	332	TBD	TBD	TBD	0.01	0	NA	TBD	TBD	TBD	TBD	
96	286BOW01	Retention/Detention basin	CP 2/3	558.2	Tule Delta	18030006	Upper Tule	36.050298	-119.520874	0.00	24	TBD	TBD	TBD	0.12	0	NA	TBD	TBD	TBD	TBD	
97	286JWL01	Seasonal wetland	CP 2/3	558.2	Tule Delta	18030006	Upper Tule	36.048324	-119.520118	0.01	23	TBD	TBD	TBD	0.28	0.54	NA	TBD	TBD	TBD	TBD	
98	288DWL02	Seasonal wetland	CP 2/3	558.2	Tule Delta	18030006	Upper Tule	36.047767	-119.520028	0.01	19	TBD	TBD	TBD	0	0	NA	TBD	TBD	TBD	TBD	
99	288BOW02	Canals/Ditches	CP 2/3	558.2	Tule Delta	18030006	Upper Tule	36.046779	-119.5194	0.37	4716	TBD	TBD	TBD	0.58	0	NA	TBD	TBD	TBD	TBD	
100	288DWL03	Seasonal wetland	CP 2/3	558.2	Tule Delta	18030006	Upper Tule	36.046175	-119.518871	0	0	TBD	TBD	TBD	0.42	0	NA	TBD	TBD	TBD	TBD	
101	288BOW03	Retention/Detention basin	CP 2/3	558.2	Tule Delta	18030006	Upper Tule	36.043226	-119.517648	0.00	2	TBD	TBD	TBD	0	0	NA	TBD	TBD	TBD	TBD	
102	288BOW05	Seasonal riverine	CP 2/3	558.2	Tule Delta	18030006	Upper Tule	36.042635	-119.516283	0.02	70	TBD	TBD	TBD	0.17	0	NA	TBD	TBD	TBD	TBD	Tule River
103	288BSW06	Riparian	CP 2/3	558.2	Tule Delta	18030006, 18030012	Upper Tule, Tulare-Buena Vista Lakes	36.042394	-119.51628	0.25	401	TBD	TBD	TBD	0.12	NA	NA	TBD	TBD	TBD	TBD	
104	289DOW03	Canals/Ditches	CP 2/3	558.2	Tule Delta	18030006, 18030012	Upper Tule, Tulare-Buena Vista Lakes	36.040089	-119.513822	0	0	TBD	TBD	TBD	0.02	0	NA	TBD	TBD	TBD	TBD	
105	289DWL04	Seasonal wetland	CP 2/3	558.2	Tule Delta	18030006, 18030012	Upper Tule, Tulare-Buena Vista Lakes	36.040063	-119.513814	0	0	TBD	TBD	TBD	0.01	0	NA	TBD	TBD	TBD	TBD	
106	289DOW02	Canals/Ditches	CP 2/3	558.2	Tule Delta	18030006, 18030012	Upper Tule, Tulare-Buena Vista Lakes	36.040017	-119.514124	0	0	TBD	TBD	TBD	0.01	0	NA	TBD	TBD	TBD	TBD	
107	289DWL02	Seasonal wetland	CP 2/3	558.2	Tule Delta	18030006, 18030012	Upper Tule, Tulare-Buena Vista Lakes	36.040006	-119.514157	0	0	TBD	TBD	TBD	0.02	0	NA	TBD	TBD	TBD	TBD	
108	289DWL01	Seasonal wetland	CP 2/3	558.2	Tule Delta	18030012	Tulare-Buena Vista Lakes	36.039928	-119.51431	0.02	37	TBD	TBD	TBD	0	0	NA	TBD	TBD	TBD	TBD	
109	289DOW01	Canals/Ditches	CP 2/3	558.2	Tule Delta	18030012	Tulare-Buena Vista Lakes	36.039895	-119.514388	0.00	33	TBD	TBD	TBD	0	0	NA	TBD	TBD	TBD	TBD	
110	290GOW01	Canals/Ditches	CP 2/3	558.2	Tule Delta	18030006, 18030012	Upper Tule, Tulare-Buena Vista Lakes	36.038126	-119.513165	0.29	3716	TBD	TBD	TBD	0.09	0	NA	TBD	TBD	TBD	TBD	
111	289DWL03	Seasonal wetland	CP 2/3	558.2	Tule Delta	18030012	Tulare-Buena Vista Lakes	36.03781	-119.512764	0	0	TBD	TBD	TBD	0.04	0	NA	TBD	TBD	TBD	TBD	
112	ACE13OW	Retention/Detention basin	CP 2/3	558.2	Tule Delta	18030012	Tulare-Buena Vista Lakes	36.031933	-119.508938	1.20	19312	TBD	TBD	TBD	0	0	NA	TBD	TBD	TBD	TBD	
113	ACE12OW	Retention/Detention basin	CP 2/3	558.2	Tule Delta	18030012	Tulare-Buena Vista Lakes	36.031759	-119.509357	0.15	2464	TBD	TBD	TBD	0	0	NA	TBD	TBD	TBD	TBD	
114	ACE16OW	Retention/Detention basin	CP 2/3	558.2	Tule Delta	18030012	Tulare-Buena Vista Lakes	36.029815	-119.507508	5.30	85479	TBD	TBD	TBD	0	0	NA	TBD	TBD	TBD	TBD	
115	290GOW02	Canals/Ditches	CP 2/3	558.2	Tule Delta	18030012	Tulare-Buena Vista Lakes	36.026238	-119.504469	2.60	33566	TBD	TBD	TBD	0.92	0	NA	TBD	TBD	TBD	TBD	
116	297GOW01	Canals/Ditches	CP 2/3	558.2	Tule Delta	18030012	Tulare-Buena Vista Lakes	36.021737	-119.505283	0.39	5084	TBD	TBD	TBD	0.05	0	NA	TBD	TBD	TBD	TBD	
117	297JWL01	Seasonal wetland	CP 2/3	558.2	Tule Delta	18030012	Tulare-Buena Vista Lakes	36.020253	-119.49963	0.24	388	TBD	TBD	TBD	0	0	NA	TBD	TBD	TBD	TBD	
118	301GOW03	Canals/Ditches	CP 2/3	558.2	Tule Delta	18030012	Tulare-Buena Vista Lakes	36.009923	-119.491375	0.22	2854	TBD	TBD	TBD	0	0	NA	TBD	TBD	TBD	TBD	
119	301RSWL92	Seasonal wetland	CP 2/3	558.2	Tule Delta	18030012	Tulare-Buena Vista Lakes	36.00988	-119.491957	0.03	51	TBD	TBD	TBD	0	0	NA	TBD	TBD	TBD	TBD	
120	301RSWL93	Seasonal wetland	CP 2/3	558.2	Tule Delta	18030012	Tulare-Buena Vista Lakes	36.009506	-119.49186	0.02	29	TBD	TBD	TBD	0	0	NA	TBD	TBD	TBD	TBD	
121	301RSWL94	Seasonal wetland	CP 2/3	558.2	Tule Delta	18030012	Tulare-Buena Vista Lakes	36.009082	-119.491445	0.01	15	TBD	TBD	TBD	0	0	NA	TBD	TBD	TBD	TBD	
122	301RSWL95	Seasonal wetland	CP 2/3	558.2	Tule Delta	18030012	Tulare-Buena Vista Lakes	36.008865	-119.491288	0.00	8	TBD	TBD	TBD	0	0	NA	TBD	TBD	TBD	TBD	
123	301RSWL96	Seasonal wetland	CP 2/3	558.2	Tule Delta	18030012	Tulare-Buena Vista Lakes	36.00886	-119.491407	0.00	1	TBD	TBD	TBD	0	0	NA	TBD	TBD	TBD	TBD	
124	301GOW02	Canals/Ditches	CP 2/3	558.2	Tule Delta	18030012	Tulare-Buena Vista Lakes	36.008217	-119.491714	0.34	4403	TBD	TBD	TBD	0.04	0	NA	TBD	TBD	TBD	TBD	
125	301GOW01	Canals/Ditches	CP 2/3	558.2	Tule Delta	18030012	Tulare-Buena Vista Lakes	36.007381	-119.495501	0.32	4125	TBD	TBD	TBD	0.05	0	NA	TBD	TBD	TBD	TBD	
126	306GOW04	Canals/Ditches	CP 2/3	558.2	Tule Delta	18030012	Tulare-Buena Vista Lakes	35.996414	-119.479997	0	0	TBD	TBD	TBD	0.05	0	NA	TBD	TBD	TBD	TBD	
127	306RSWL88	Seasonal wetland	CP 2/3	558.2	Tule Delta	18030012	Tulare-Buena Vista Lakes	35.996345	-119.482148	0	0	TBD	TBD	TBD	0.02	0	NA	TBD	TBD	TBD	TBD	
128	306RSWL89	Seasonal wetland	CP 2/3	558.2	Tule Delta	18030012	Tulare-Buena Vista Lakes	35.996197	-119.481978	0	0	TBD	TBD	TBD	0.01	0	NA	TBD	TBD	TBD	TBD	
129	306RSWL90	Seasonal wetland	CP 2/3	558.2	Tule Delta	18030012	Tulare-Buena Vista Lakes	35.995891	-119.481747	0	0	TBD	TBD	TBD	0.02	0	NA	TBD	TBD	TBD	TBD	
130	306RSWL92	Seasonal wetland	CP 2/3	558.2	Tule Delta	18030012	Tulare-Buena Vista Lakes	35.995414	-119.481419	0.00	3	TBD	TBD	TBD	0	0	NA	TBD	TBD	TBD	TBD	
131	306RSWL94	Seasonal wetland	CP 2/3	558.2	Tule Delta	18030012	Tulare-Buena Vista Lakes	35.995311	-119.481334	0.01	9	TBD	TBD	TBD	0	0	NA	TBD	TBD	TBD	TBD	
132	306RSWL93	Seasonal wetland	CP 2/3	558.2	Tule Delta	18030012	Tulare-Buena Vista Lakes	35.995239	-119.481375	0.04	72	TBD	TBD	TBD	0	0	NA	TBD	TBD	TBD	TBD	

Index	Feature ID	Type	Construction Package	Basin Plan HUC	Basin Plan Watershed Name	USGS HUC	USGS Watershed Name	Latitude	Longitude	Direct Permanent (acres)	Direct Permanent (CY)	Mitigation Ratio (n:1)	Mitigation Acreage	Mitigation Location	Direct Temporary (acres)	Direct Temporary No Fill (acres)	Indirect Bisect (acres)	Mitigation Ratio (n:1)	Mitigation acreage (On-site, in Kind)	Additional Mitigation	Additional Mitigation Location	Notes
133	306RSWL95	Seasonal wetland	CP 2/3	558.2	Tule Delta	18030012	Tulare-Buena Vista Lakes	35.995221	-119.481261	0.01	10	TBD	TBD	TBD	0	0	NA	TBD	TBD	TBD	TBD	
134	306RSWL96	Seasonal wetland	CP 2/3	558.2	Tule Delta	18030012	Tulare-Buena Vista Lakes	35.995015	-119.481202	0.02	33	TBD	TBD	TBD	0	0	NA	TBD	TBD	TBD	TBD	
135	306RSWL97	Seasonal wetland	CP 2/3	558.2	Tule Delta	18030012	Tulare-Buena Vista Lakes	35.994887	-119.481108	0.01	12	TBD	TBD	TBD	0	0	NA	TBD	TBD	TBD	TBD	
136	306RSWL98	Seasonal wetland	CP 2/3	558.2	Tule Delta	18030012	Tulare-Buena Vista Lakes	35.994714	-119.480983	0.03	42	TBD	TBD	TBD	0	0	NA	TBD	TBD	TBD	TBD	
137	306GOW03	Canals/Ditches	CP 2/3	558.2	Tule Delta	18030012	Tulare-Buena Vista Lakes	35.994545	-119.482611	0.61	7905	TBD	TBD	TBD	0.04	0	NA	TBD	TBD	TBD	TBD	
138	306RSWL99	Seasonal wetland	CP 2/3	558.2	Tule Delta	18030012	Tulare-Buena Vista Lakes	35.994455	-119.480785	0.03	44	TBD	TBD	TBD	0	0	NA	TBD	TBD	TBD	TBD	
139	306GOW02	Canals/Ditches	CP 2/3	558.2	Tule Delta	18030012	Tulare-Buena Vista Lakes	35.992637	-119.485302	0.01	124	TBD	TBD	TBD	0	0	NA	TBD	TBD	TBD	TBD	
140	307GOW01	Retention/Detention basin	CP 2/3	558.2	Tule Delta	18030012	Tulare-Buena Vista Lakes	35.991665	-119.479348	0.93	14995	TBD	TBD	TBD	0	0	NA	TBD	TBD	TBD	TBD	
141	309GOW01	Canals/Ditches	CP 2/3	558.2	Tule Delta	18030012	Tulare-Buena Vista Lakes	35.987064	-119.476128	1.16	14947	TBD	TBD	TBD	0	0	NA	TBD	TBD	TBD	TBD	
142	309DOW01	Canals/Ditches	CP 2/3	558.2	Tule Delta	18030012	Tulare-Buena Vista Lakes	35.979842	-119.470655	0.95	12215	TBD	TBD	TBD	0	0	NA	TBD	TBD	TBD	TBD	
143	317EOW03	Canals/Ditches	CP 2/3	558.2	Tule Delta	18030012	Tulare-Buena Vista Lakes	35.972201	-119.465907	0.52	6686	TBD	TBD	TBD	0	0	NA	TBD	TBD	TBD	TBD	
144	315DWL01	Seasonal wetland	CP 2/3	558.2	Tule Delta	18030012	Tulare-Buena Vista Lakes	35.971573	-119.464775	0.32	509	TBD	TBD	TBD	0.00	0	NA	TBD	TBD	TBD	TBD	
145	315GOW01	Canals/Ditches	CP 2/3	558.2	Tule Delta	18030012	Tulare-Buena Vista Lakes	35.970323	-119.465403	1.93	24873	TBD	TBD	TBD	1.34	0	NA	TBD	TBD	TBD	TBD	
146	315KWL01	Seasonal wetland	CP 2/3	558.2	Tule Delta	18030012	Tulare-Buena Vista Lakes	35.968375	-119.461762	0	0	TBD	TBD	TBD	0.01	0	NA	TBD	TBD	TBD	TBD	
147	CCE241WL	Vernal Pools and Swales	CP 2/3	558.2	Tule Delta	18030012	Tulare-Buena Vista Lakes	35.962888	-119.458537	0.03	21	TBD	TBD	TBD	0	0		TBD	TBD	TBD	TBD	
148	318DOW01	Canals/Ditches	CP 2/3	558.2	Tule Delta	18030012	Tulare-Buena Vista Lakes	35.962361	-119.458182	0.10	1332	TBD	TBD	TBD	0	0	NA	TBD	TBD	TBD	TBD	
149	318KWL01	Seasonal wetland	CP 2/3	558.2	Tule Delta	18030012	Tulare-Buena Vista Lakes	35.961299	-119.456583	0.18	298	TBD	TBD	TBD	0.22	0	NA	TBD	TBD	TBD	TBD	
150	318DWL01	Seasonal wetland	CP 2/3	558.2	Tule Delta	18030012	Tulare-Buena Vista Lakes	35.960937	-119.456925	0.14	220	TBD	TBD	TBD	0	0	NA	TBD	TBD	TBD	TBD	
151	318DOW02	Canals/Ditches	CP 2/3	558.2	Tule Delta	18030012	Tulare-Buena Vista Lakes	35.960749	-119.456554	0.00	56	TBD	TBD	TBD	0	0	NA	TBD	TBD	TBD	TBD	
152	322EOW01	Canals/Ditches	CP 2/3	558.2	Tule Delta	18030012	Tulare-Buena Vista Lakes	35.95835	-119.455132	11.77	151940	TBD	TBD	TBD	0.01	0	NA	TBD	TBD	TBD	TBD	
153	325EOW01	Retention/Detention basin	CP 2/3	558.2	Tule Delta	18030005	Upper Deer-Upper White	35.949498	-119.44718	0.01	205	TBD	TBD	TBD	0	0	NA	TBD	TBD	TBD	TBD	
154	1205OW20	Canals/Ditches	CP 2/3	558.2	Tule Delta	18030012	Tulare-Buena Vista Lakes	35.949024	-119.451578	0.01	183	TBD	TBD	TBD	0	0	NA	TBD	TBD	TBD	TBD	
155	325KWL01	Seasonal wetland	CP 2/3	558.2	Tule Delta	18030005	Upper Deer-Upper White	35.948332	-119.447141	0.02	34	TBD	TBD	TBD	0.01	0	NA	TBD	TBD	TBD	TBD	
156	AB003AWL01	Seasonal wetland	CP 2/3	558.2	Tule Delta	18030005	Upper Deer-Upper White	35.935302	-119.437903	0.03	41	TBD	TBD	TBD	0	0	NA	TBD	TBD	TBD	TBD	
157	330EOW02	Canals/Ditches	CP 2/3	558.2	Tule Delta	18030005	Upper Deer-Upper White	35.92674	-119.431821	1.60	20666	TBD	TBD	TBD	0.05	0	NA	TBD	TBD	TBD	TBD	
158	AB006AWL01	Seasonal wetland	CP 2/3	558.2	Tule Delta	18030005	Upper Deer-Upper White	35.920839	-119.428874	0.39	624	TBD	TBD	TBD	0.03	0	NA	TBD	TBD	TBD	TBD	
159	337EOW01	Seasonal riverine	CP 2/3	558.2	Tule Delta	18030005	Upper Deer-Upper White	35.920277	-119.428665	0.00	6	TBD	TBD	TBD	0.06	0.08	NA	TBD	TBD	TBD	TBD	Deer Creek
160	333ASW01	Riparian	CP 2/3	558.2	Tule Delta	18030005	Upper Deer-Upper White	35.920166	-119.427554	0.063001	102	TBD	TBD	TBD	0.02	NA	NA	TBD	TBD	TBD	TBD	
161	336PIOW01	Retention/Detention basin	CP 2/3	558.2	Tule Delta	18030005	Upper Deer-Upper White	35.916218	-119.42642	0.90	14514	TBD	TBD	TBD	1.93	4.10	NA	TBD	TBD	TBD	TBD	
162	412OW07	Canals/Ditches	CP 2/3	558.2	Tule Delta	18030005	Upper Deer-Upper White	35.912817	-119.438954	3.79	48892	TBD	TBD	TBD	0	0	NA	TBD	TBD	TBD	TBD	
163	412OW12	Canals/Ditches	CP 2/3	558.2	Tule Delta	18030005	Upper Deer-Upper White	35.912717	-119.447187	0.07	912	TBD	TBD	TBD	0.01	0	NA	TBD	TBD	TBD	TBD	
164	412OW04	Canals/Ditches	CP 2/3	558.2	Tule Delta	18030005	Upper Deer-Upper White	35.912623	-119.437885	0.27	3453	TBD	TBD	TBD	0.16	0	NA	TBD	TBD	TBD	TBD	
165	412OW03	Retention/Detention basin	CP 2/3	558.2	Tule Delta	18030005	Upper Deer-Upper White	35.912297	-119.438288	0	0	TBD	TBD	TBD	0.03	0	NA	TBD	TBD	TBD	TBD	
166	1205OW21	Canals/Ditches	CP 2/3	558.2	Tule Delta	18030005	Upper Deer-Upper White	35.905716	-119.447783	0.07	846	TBD	TBD	TBD	0	0	NA	TBD	TBD	TBD	TBD	
167	349FOW01	Retention/Detention basin	CP 2/3	558.2	Tule Delta	18030005	Upper Deer-Upper White	35.894133	-119.417167	19.83	320004	TBD	TBD	TBD	0.30	0	NA	TBD	TBD	TBD	TBD	
168	349FOW04	Canals/Ditches	CP 2/3	558.2	Tule Delta	18030005	Upper Deer-Upper White	35.891494	-119.417185	2.09	26917	TBD	TBD	TBD	0.04	0	NA	TBD	TBD	TBD	TBD	
169	349FOW02	Canals/Ditches	CP 2/3	558.2	Tule Delta	18030005	Upper Deer-Upper White	35.891402	-119.417164	0.35	4508	TBD	TBD	TBD	0.00	0	NA	TBD	TBD	TBD	TBD	
170	349FOW03	Canals/Ditches	CP 2/3	558.2	Tule Delta	18030005	Upper Deer-Upper White	35.891179	-119.417301	0.11	1452	TBD	TBD	TBD	0	0	NA	TBD	TBD	TBD	TBD	
171	WH140OW01	Canals/Ditches	CP 2/3	558.2	Tule Delta	18030005	Upper Deer-Upper White	35.869655	-119.412884	0.06	802	TBD	TBD	TBD	0.02	0	NA	TBD	TBD	TBD	TBD	
172	AB016AWL03	Vernal Pools and Swales	CP 2/3	558.2	Tule Delta	18030005	Upper Deer-Upper White	35.869222	-119.412571	0.05	41	TBD	TBD	TBD	0	0	0.01	TBD	TBD	TBD	TBD	
173	AB016AWL01	Vernal Pools and Swales	CP 2/3	558.2	Tule Delta	18030005	Upper Deer-Upper White	35.867994	-119.411932	0.03	20	TBD	TBD	TBD	0	0	1.31	TBD	TBD	TBD	TBD	
174	AB017AWL01	Vernal Pools and Swales	CP 2/3	558.2	Tule Delta	18030005	Upper Deer-Upper White	35.866014	-119.412216	0.07	53	TBD	TBD	TBD	0	0	0.07	TBD	TBD	TBD	TBD	
175	AB017AWL07	Vernal Pools and Swales	CP 2/3	558.2	Tule Delta	18030005	Upper Deer-Upper White	35.860776	-119.411956	0.11	87	TBD	TBD	TBD	0	0	0.04	TBD	TBD	TBD	TBD	
176	AB017AWL08	Vernal Pools and Swales	CP 2/3	558.2	Tule Delta	18030005	Upper Deer-Upper White	35.860411	-119.412068	0.02	17	TBD	TBD	TBD	0	0	0.09	TBD	TBD	TBD	TBD	
177	AB018BWL02	Vernal Pools and Swales	CP 2/3	558.2	Tule Delta	18030005	Upper Deer-Upper White	35.859403	-119.411017	0.68	545	TBD	TBD	TBD	0	0	1.74	TBD	TBD	TBD	TBD	
178	AB018AWL01	Vernal Pools and Swales	CP 2/3	558.2	Tule Delta	18030005	Upper Deer-Upper White	35.858652	-119.411619	0.04	31	TBD	TBD	TBD	0	0		TBD	TBD	TBD	TBD	
179	AB018BWL01	Canals/Ditches	CP 2/3	558.2	Tule Delta	18030005	Upper Deer-Upper White	35.851929	-119.411078	2.43	31342	TBD	TBD	TBD	0.13	0	NA	TBD	TBD	TBD	TBD	
180	AB019BOW01	Retention/Detention basin	CP 2/3	558.2	Tule Delta	18030005	Upper Deer-Upper White	35.847952	-119.410739	0.03	550	TBD	TBD	TBD	0	0	NA	TBD	TBD	TBD	TBD	
181	385FOW01	Canals/Ditches	CP 2/3	558.2	Tule Delta	18030005	Upper Deer-Upper White	35.840514	-119.409424	0.03	380	TBD	TBD	TBD	0.02	0	NA	TBD	TBD	TBD	TBD	
182	1205OW24	Retention/Detention basin	CP 4	558.7	Semitropic	18030005	Upper Deer-Upper White	35.76782	-119.391791	0	0	TBD	TBD	TBD	0.10	0	NA	TBD	TBD	TBD	TBD	
183	BN153WL01	Vernal Pools and Swales	CP 4	558.7	Semitropic	18030005	Upper Deer-Upper White	35.744214	-119.383386	0.20	162	TBD	TBD	TBD	0	0	0.97	TBD	TBD	TBD	TBD	
184	1205WL28	Vernal Pools and Swales	CP 4	558.7	Semitropic	18030005	Upper Deer-Upper White	35.743488	-119.383531	0.00	1	TBD	TBD	TBD	0	0	0.02	TBD	TBD	TBD	TBD	
185	1205WL29	Vernal Pools and Swales	CP 4	558.7	Semitropic	18030005	Upper Deer-Upper White	35.743266	-119.383531	0.00	2	TBD	TBD	TBD	0	0	0.01	TBD	TBD	TBD	TBD	
186	AB037PIOW01	Canals/Ditches	CP 4	558.7	Semitropic	18030005	Upper Deer-Upper White	35.743129	-119.383907	0.45	5867	TBD	TBD	TBD	0.31	0	NA	TBD	TBD	TBD	TBD	
187	BN153WL02	Vernal Pools and Swales	CP 4	558.7	Semitropic	18030005	Upper Deer-Upper White	35.743075	-119.383453	0.10	79	TBD	TBD	TBD	0	0	0.15	TBD	TBD	TBD	TBD	
188	1205WL20	Vernal Pools and Swales	CP 4	558.7	Semitropic	18030005	Upper Deer-Upper White	35.741908	-119.382565	2.55	2055	TBD	TBD	TBD	0	0	4.03	TBD	TBD	TBD	TBD	
189	1205WL23	Vernal Pools and Swales	CP 4	558.7	Semitropic	18030005	Upper Deer-Upper White	35.741642	-119.383107	0.00	0	TBD	TBD	TBD	0	0	0.03	TBD	TBD	TBD	TBD	
190	1205WL17	Vernal Pools and Swales	CP 4	558.7	Semitropic	18030005	Upper Deer-Upper White	35.740966	-119.380994	0	0	TBD	TBD	TBD	0	0	0.48	TBD	TBD	TBD	TBD	
191	1205WL13	Vernal Pools and Swales	CP 4	558.7	Semitropic	18030005	Upper Deer-Upper White	35.740724	-119.38199	0.14	116	TBD	TBD	TBD	0	0		TBD	TBD	TBD	TBD	
192	1205WL15	Vernal Pools and Swales	CP 4	558.7	Semitropic	18030005	Upper Deer-Upper White	35.740394	-119.382048	0.20	162	TBD	TBD	TBD	0	0	0.27	TBD	TBD	TBD	TBD	
193	1205WL14	Vernal Pools and Swales	CP 4	558.7	Semitropic	18030005	Upper Deer-Upper White	35.740371	-119.38151	0.14	116	TBD	TBD	TBD	0	0	0.06	TBD	TBD	TBD	TBD	
194	1205WL10	Vernal Pools and Swales	CP 4	558.7	Semitropic	18030005	Upper Deer-Upper White	35.739236	-119.38103	0.26	214	TBD	TBD	TBD	0	0	0.17	TBD	TBD	TBD	TBD	
195	1205WL11	Vernal Pools and Swales	CP 4	558.7	Semitropic	18030005	Upper Deer-Upper White	35.738626	-119.380224	0.02	13	TBD	TBD	TBD	0	0		TBD	TBD	TBD	TBD	
196	1205WL03	Vernal Pools and Swales	CP 4	558.7	Semitropic	18030005	Upper Deer-Upper White	35.738121	-119.379855	0.96	776	TBD	TBD	TBD	0	0	2.08	TBD	TBD	TBD	TBD	
197	1205WL07	Vernal Pools and Swales	CP 4	558.7	Semitropic	18030005	Upper Deer-Upper White	35.737527	-119.379644	0.01	10	TBD	TBD	TBD	0	0	0.00	TBD	TBD	TBD	TBD	
198	1205WL05	Vernal Pools and Swales	CP 4	558.7	Semitropic	18030005	Upper Deer-Upper White	35.73739	-119.379423	0.01	7	TBD	TBD	TBD	0	0		TBD	TBD	TBD	TBD	
199	1205WL06	Vernal Pools and Swales	CP 4	558.7	Semitropic	18030005	Upper Deer-Upper White	35.737308	-119.379369	0.01	6	TBD	TBD	TBD	0	0		TBD	TBD	TBD	TBD	
200	1205WL08	Vernal Pools and Swales	CP 4	558.7	Semitropic	18030005	Upper Deer-Upper White	35.737195	-119.379251	0.01	10	TBD	TBD	TBD	0	0		TBD	TBD	TBD	TBD	

Attachment 4

Impacted Waterbodies in the PP1 Study Area

Index	Feature ID	Type	Construction Package	Basin Plan HUC	Basin Plan Watershed Name	USGS HUC	USGS Watershed Name	Latitude	Longitude	Direct Permanent (acres)	Direct Permanent (CY)	Mitigation Ratio (n:1)	Mitigation Acreage	Mitigation Location	Direct Temporary (acres)	Direct Temporary No Fill (acres)	Indirect Bisect (acres)	Mitigation Ratio (n:1)	Mitigation acreage (On-site, in Kind)	Additional Mitigation	Additional Mitigation Location	Notes
201	AB040PIOW01	Retention/Detention basin	CP 4	558.7	Semitropic	18030005	Upper Deer-Upper White	35.733038	-119.375328	0.68	10895	TBD	TBD	TBD	0	0	NA	TBD	TBD	TBD	TBD	
202	AB040BOW01	Canals/Ditches	CP 4	558.7	Semitropic	18030005	Upper Deer-Upper White	35.732251	-119.376621	0	0	TBD	TBD	TBD	0.46	0	NA	TBD	TBD	TBD	TBD	
203	1009OW46	Retention/Detention basin	CP 4	558.7	Semitropic	18030005	Upper Deer-Upper White	35.731961	-119.374612	0.11	1699	TBD	TBD	TBD	0.00	0	NA	TBD	TBD	TBD	TBD	
204	AB044BOW02	Retention/Detention basin	CP 4	558.7	Semitropic	18030005	Upper Deer-Upper White	35.718148	-119.366337	0.00	0	TBD	TBD	TBD	0	0	NA	TBD	TBD	TBD	TBD	
205	AB044BOW01	Retention/Detention basin	CP 4	558.7	Semitropic	18030005	Upper Deer-Upper White	35.717502	-119.365546	0.15	2431	TBD	TBD	TBD	0	0	NA	TBD	TBD	TBD	TBD	
206	CCE130OW	Retention/Detention basin	CP 4	558.7	Semitropic	18030005	Upper Deer-Upper White	35.702964	-119.357029	0.00	32	TBD	TBD	TBD	0	0	NA	TBD	TBD	TBD	TBD	
207	AB056BOW01	Canals/Ditches	CP 4	558.7	Semitropic	18030005	Upper Deer-Upper White	35.674285	-119.336403	0.12	1613	TBD	TBD	TBD	0.07	0	NA	TBD	TBD	TBD	TBD	
208	478AOW01	Seasonal riverine	CP 4	558.7	Semitropic	18030004	Upper Poso	35.664679	-119.333628	0.00	6	TBD	TBD	TBD	0.02	0.10	NA	TBD	TBD	TBD	TBD	Poso Creek
209	478ASW01	Riparian	CP 4	558.7	Semitropic	18030004	Upper Poso	35.664244	-119.332978	0.41	655	TBD	TBD	TBD	0	NA	NA	TBD	TBD	TBD	TBD	
210	BN162OW01	Retention/Detention basin	CP 4	558.8	North Kern	18030004	Upper Poso	35.654083	-119.331837	0.36	5868	TBD	TBD	TBD	0.64	0	NA	TBD	TBD	TBD	TBD	
211	490AOW01	Canals/Ditches	CP 4	558.8	North Kern	18030004	Upper Poso	35.637647	-119.337501	0.50	6458	TBD	TBD	TBD	0.04	0	NA	TBD	TBD	TBD	TBD	
212	491AOW01	Canals/Ditches	CP 4	558.8	North Kern	18030004	Upper Poso	35.637586	-119.330782	0	0	TBD	TBD	TBD	0.03	0	NA	TBD	TBD	TBD	TBD	
213	1205OW01	Retention/Detention basin	CP 4	558.8	North Kern	18030004	Upper Poso	35.637435	-119.348467	0.04	661	TBD	TBD	TBD	0	0	NA	TBD	TBD	TBD	TBD	
214	490ASW01	Retention/Detention basin	CP 4	558.8	North Kern	18030004	Upper Poso	35.637198	-119.339394	0.17	2706	TBD	TBD	TBD	0	0	NA	TBD	TBD	TBD	TBD	
215	498ASW02	Retention/Detention basin	CP 4	558.8	North Kern	18030004	Upper Poso	35.612675	-119.333954	0.19	3037	TBD	TBD	TBD	0	0	NA	TBD	TBD	TBD	TBD	
216	513OW10	Retention/Detention basin	CP 4	558.8	North Kern	18030004	Upper Poso	35.609507	-119.335194	0.00	7	TBD	TBD	TBD	0	0	NA	TBD	TBD	TBD	TBD	
217	512PIOW01	Retention/Detention basin	CP 4	558.8	North Kern	18030004	Upper Poso	35.586438	-119.321921	0	0	TBD	TBD	TBD	0.87	0	NA	TBD	TBD	TBD	TBD	
218	KM006BOW02	Retention/Detention basin	CP 4	558.8	North Kern	18030004	Upper Poso	35.572718	-119.331459	0	0	TBD	TBD	TBD	0.12	0	NA	TBD	TBD	TBD	TBD	
219	KM006PIOW01	Retention/Detention basin	CP 4	558.8	North Kern	18030004	Upper Poso	35.572191	-119.332707	0	0	TBD	TBD	TBD	0.19	0	NA	TBD	TBD	TBD	TBD	
220	KM006BOW03	Retention/Detention basin	CP 4	558.8	North Kern	18030004	Upper Poso	35.571973	-119.331513	0	0	TBD	TBD	TBD	0.24	0.02	NA	TBD	TBD	TBD	TBD	
221	KM006BOW01	Retention/Detention basin	CP 4	558.8	North Kern	18030004	Upper Poso	35.568946	-119.331548	0	0	TBD	TBD	TBD	0.02	0.01	NA	TBD	TBD	TBD	TBD	
222	CCE133OW	Retention/Detention basin	CP 4	558.8	North Kern	18030004	Upper Poso	35.564487	-119.331387	0.10	1581	TBD	TBD	TBD	0	0	NA	TBD	TBD	TBD	TBD	
223	1205OW15	Retention/Detention basin	CP 4	558.8	North Kern	18030004	Upper Poso	35.557713	-119.329506	0.06	890	TBD	TBD	TBD	0	0	NA	TBD	TBD	TBD	TBD	
224	KM008BOW02	Retention/Detention basin	CP 4	558.8	North Kern	18030004	Upper Poso	35.555852	-119.328642	0.31	5037	TBD	TBD	TBD	0	0	NA	TBD	TBD	TBD	TBD	
225	565AOW01	Retention/Detention basin	CP 4	558.8	North Kern	18030004	Upper Poso	35.529317	-119.304739	0.05	753	TBD	TBD	TBD	0	0	NA	TBD	TBD	TBD	TBD	
226	ACE09OW	Canals/Ditches	CP 4	558.8	North Kern	18030004	Upper Poso	35.529288	-119.306062	0	0	TBD	TBD	TBD	0.02	0	NA	TBD	TBD	TBD	TBD	
227	ACE08OW	Canals/Ditches	CP 4	558.8	North Kern	18030004	Upper Poso	35.528838	-119.305459	0	0	TBD	TBD	TBD	0.02	0	NA	TBD	TBD	TBD	TBD	
228	576PIOW01	Retention/Detention basin	CP 4	558.8	North Kern	18030004	Upper Poso	35.521879	-119.296196	0.09	1465	TBD	TBD	TBD	0	0	NA	TBD	TBD	TBD	TBD	
229	591PIOW01	Retention/Detention basin	CP 4	558.8	North Kern	18030004	Upper Poso	35.510652	-119.282744	0.05	807	TBD	TBD	TBD	0	0	NA	TBD	TBD	TBD	TBD	
230	CCE147OW	Retention/Detention basin	CP 4	558.8	North Kern	18030012	Tulare-Buena Vista Lakes	35.497521	-119.264529	0	0	TBD	TBD	TBD	0.32	0	NA	TBD	TBD	TBD	TBD	
231	612PIOW01	Retention/Detention basin	CP 4	558.8	North Kern	18030012	Tulare-Buena Vista Lakes	35.494318	-119.262394	0.00	18	TBD	TBD	TBD	0.08	0	NA	TBD	TBD	TBD	TBD	
232	612BOW01	Retention/Detention basin	CP 4	558.8	North Kern	18030012	Tulare-Buena Vista Lakes	35.492302	-119.260226	0	0	TBD	TBD	TBD	0	0.04	NA	TBD	TBD	TBD	TBD	Temporary-No Fill Impacts Only
233	622BOW02	Retention/Detention basin	CP 4	558.8	North Kern	18030012	Tulare-Buena Vista Lakes	35.483404	-119.250776	1.31	21096	TBD	TBD	TBD	0.10	0.39	NA	TBD	TBD	TBD	TBD	
234	1009OW61	Retention/Detention basin	CP 4	558.8	North Kern	18030012	Tulare-Buena Vista Lakes	35.470959	-119.251899	0.03	485	TBD	TBD	TBD	0	0	NA	TBD	TBD	TBD	TBD	
235	639PIOW01	Retention/Detention basin	CP 4	558.8	North Kern	18030012	Tulare-Buena Vista Lakes	35.466577	-119.216332	0	0	TBD	TBD	TBD	0.56	0	NA	TBD	TBD	TBD	TBD	
236	659BOW03	Canals/Ditches	CP 4	558.8	North Kern	18030012	Tulare-Buena Vista Lakes	35.442201	-119.199691	0.07	855	TBD	TBD	TBD	0.01	0	NA	TBD	TBD	TBD	TBD	

CALIFORNIA High-Speed Rail Authority U.S. Department of Transportation Federal Railroad Administration